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February 1998

Rural Conditions and Trends

Vol. 8, No. 3

Value-Added Manufacturing—An Important Link to the Larger U.S. Economy

The value of raw materials in agricultural- and wood-based products represents only a fraction of each dollar paid by the consumer for these products. Activities that add value to raw inputs are an important link between agriculture, forestry, and the broader economy.

This Rural Industries issue of *Rural Conditions and Trends* is devoted to analyses of farm- and forest-related manufacturing. Adding value to locally grown farm and forest products through processing and marketing activities is a popular approach to revitalizing rural communities. Federal and State agencies have shown considerable interest in helping communities implement "value-added" economic development efforts. However, little research and analysis is available to policymakers, community leaders, and economic development practitioners who are designing and evaluating "value-added" development strategies. This issue of *Rural Conditions and Trends* is intended to fill this need.

In this issue we report on manufacturing industries that rely on farm or forest products for a substantial portion of their material inputs (excluding labor, capital, and services). Using Department of Commerce data on interindustry transactions, we identified a set of manufacturing industries that obtain at least 20 percent of their inputs from farm or forest products, either directly from the farm or forestry/logging industries or indirectly through early-stage processors or wholesalers (see appendix 2 "Definitions"). We refer to this selected group of farm- and forest-based manufacturers as "value-added manufacturers." Technically, all manufacturing industries are "value-added manufacturers," because all add value to their material inputs. For the sake of simplicity, when we refer to "value-added manufacturers" in this issue, it is understood that we are referring to manufacturers that rely on farm- and forest-based materials.

The articles in this issue look at various aspects of these industries and the demand for their products. Trends in industrial production show that most value-added sectors are growing at a moderate rate, but tobacco and leather products are stagnant or declining. Geographic patterns of job growth and plant location indicate that value-added industries are a growing source of rural jobs and that value-added establishments have increasingly chosen rural locations during the 1990's. Lower rural labor costs may be one of the factors attracting value-added manufacturers. Rural nonmetro value-added workers earn about 20 percent less than their urban counterparts. Value-added industries rely more on low-skill, male, and Hispanic workers than do other manufacturing industries. Wages are lower in value-added industries than they are in other manufacturing, a reflection of the low skill requirements and relatively few professional and technical workers. Value-added industries support additional economic activity in their local area by purchasing raw materials locally. Analyses of capital use by value-added manufacturers show that food, tobacco, and paper manufacturers are among the more capital-intensive manufacturing businesses, while manufacturers of lumber, other basic wood products, and leather products use much less capital per worker. Recent levels of capital investment are consistent with the moderate growth during the 1990's shown by production indexes. Analysis of capital investment decisions by individual value-added businesses shows that expansion of productive capacity is the most frequently cited reason for undertaking investment plans. Most value-added manufacturers used internally generated funds or bank loans to finance their investment plans, and most did not have difficulty arranging outside financing. Exports are an important component of the demand for value-added manufacturers' products, and value-added exports support over 90,000 U.S. jobs. Holding aside the effects of fluctuations in international financial markets, trade liberalization as a result of the Uruguay Round of the General Agreement on Tariffs and Trade should expand markets for many value-added products.

In summary, farm- and forest-based value-added industries have potential to bring additional economic growth to rural areas rich in agricultural and forest resources. Low labor costs and access to raw materials at rural locations are attractive to value-added processors. Less stringent environmental regulations and lower taxes may also attract plants to rural areas. Community leaders should be aware that jobs in value-added industry are

relatively low in skill and educational requirements (see Michael J. Broadway, "Hogtowns and Rural Development," *Rural Development Perspectives* vol. 9, no.1, February 1994). Value-added jobs generally pay less than jobs in other manufacturing industries, but more than jobs in food service and retail trade.

Value-added industries are growing and expanding productive capacity, but not as fast as some other industries that also have a strong presence in rural areas, such as industrial machinery, transportation, and electrical equipment. The value-added development strategy may be best-suited for rural communities that are rich in natural resources, but lack easy access to customers, skilled work force, natural amenities, infrastructure, or "the critical mass" of related firms needed to attract businesses in faster growing industries.

In addition to our analysis of value-added industries, this issue also includes a special appendix to serve the needs of those readers who rely on Rural Conditions and Trends for the latest estimates of employment and earnings in all industries. Farm and farm-related employment and food and fiber employment estimates first published last year have been updated to more recent years and appear in the second special appendix. Estimates of economic activity generated by exports of bulk and processed agricultural products (published in previous years in ERS' Foreign Agricultural Trade of the United States series of reports) appear in the last appendix in this issue.

Most of the Consumer Dollar Goes to Value-Added Activities

Value added is defined as the difference between the final value of products and the value of the materials and inputs used to manufacture them. Value is added to raw materials by processing, refining, manufacturing, transporting, grading, assembling, packaging, and delivering products in a form that satisfies consumers' wants. The value added at each stage (farm, manufacturing, wholesale, transportation, and retail/food service) equals payments to factors of production (wages and salaries, dividends and interest, rent, and payment for services from other businesses). Labor costs are the largest component of value added, accounting for about 47 cents of each dollar added to farm products beyond the farm gate. The Food and Fiber System and farm and farm-related employment (FFRE) estimates reported in this issue demonstrate that value-added activities are an important link between production agriculture and the larger U.S. economy (app. tables 10, 11, and 12). Farm production, fisheries, forestry, and agricultural services account for only 2 percent of U.S. jobs, but the broader measure of FFRE indicates that 15 percent of jobs have a link to agriculture.

The value of raw materials, such as wheat, corn, livestock, cotton, and logs, typically represents only a small fraction of each dollar spent on consumer products made from agricultural and forest products. For example, the farm value of U.S.-grown food commodities represented 21 cents of each consumer dollar spent on food products in 1994 (similar statistics for wood products are not available). The share is much smaller for manufactured products like breakfast cereals and cigarettes.

Value-added beyond the farm gate has grown steadily, while farm receipts have grown more slowly. The farm share of the consumer food dollar fell from roughly one-third in the early 1970's to 21 percent in 1994. (Comparable statistics are unavailable for the wood products sector, but trends appear to be similar.) Much value-added activity occurs in urban areas. At the same time, more farm dollars appear to be bypassing small rural communities. As the number of people living on farms has fallen, many retail, service, farm-input, and marketing businesses have closed in far-flung small towns. As a result, farm families are more likely to spend their income in larger towns and cities. A large share of interest and rental payments in the increasingly capital-intensive farm sector may also go to individuals and businesses outside the local community. These trends have encouraged communities to adopt value-added development strategies as a means of revitalizing their economies.

Focus on Value-Added Manufacturing

In this issue, we focus on manufacturing activities that process agricultural raw materials, the type of value-added activity most likely to locate in rural areas. Retail, wholesale, transportation, and service activities generate more value-added than does manufacturing (see Food and Fiber System estimates of value-added by sector), but these activities tend to be located in urban areas near consumers. Direct farm marketing and agricultural tourism are an increasingly popular means of bringing retail and service value-added to rural areas (Fred Gale, "Direct Farm Marketing as a Rural Development Tool," *Rural Development Perspectives*, vol. 12, no. 2, pp. 19-25).

Economists have distinguished between "traditional" and "innovative" value-added activities. Traditional activities include flour-milling, meat packing, traditional bulk wholesaling, retailing, and farmers' markets. These activities are often mature industries, where the location of activity is long-established and determined by comparative advantage (the relative efficiency of producing a product in a particular region, determined by the region's labor cost, endowment of natural resources, and other factors). Recently, new farmers' markets have been established in many nontraditional urban locations and comparative advantage has changed in some industries. Red meat packing has shifted from urban to rural locations, and the pork industry has moved from the upper Midwest to the Southeast. Milk production and processing is shifting from the upper Midwest to Western States, and further shifts may occur if the current system of milk marketing orders is abolished.

Much of the attention has been focused on innovative value-added activities (direct marketing, onfarm recreation, biotechnology), industrial uses for agricultural and forest products (such as ethanol and soy-based inks), and nontraditional crops (such as crambe and kenaf) that can be used as industrial inputs. These activities are usually so specialized that they are not measured separately in statistics on businesses published by the Bureau of the Census and other Government agencies. Because we rely upon these statistics for much of our analysis, this issue will deal with broader statistical categories, which are often dominated by traditional value-added businesses.

Many manufacturing industries use inputs derived from agricultural and forest products. Besides food, tobacco, lumber, and paper industries, the chemical and textile industries each used over $5 billion of agriculturally derived materials in 1992 (See *Industrial Uses of Agricultural Materials Situation and Outlook Report*, IUS-7, July 1997). The furniture industry used over $4 billion, rubber and miscellaneous plastics and leather industries used between $2 and $3 billion, and the electrical equipment, stone, clay, and glass, apparel, and miscellaneous manufacturing industries each used over $1 billion of agriculturally derived materials. We have analyzed trends only for industries where agricultural and forest products make up at least 20 percent of material inputs (see appendix 2, "Definitions"). This delineation of industries is based on the four-digit Standard Industrial Classification (SIC) codes, but some data are available only for less detailed two- or three-digit codes. Therefore industries classified as value-added vary somewhat among articles. *[Fred Gale, 202-694-5349, fgale@econ.ag.gov]*

Agricultural- and Wood Products-Based Manufacturing Industries Growing at a Modest Pace

A substantial share of economic activity is linked to agricultural- and forest-based raw inputs. Nonmetro areas have captured a relatively large share, but metro areas claim most of the value-added activity. A large share of the value that is added is paid to owners of capital. New investment is modest, consistent with modest rates of growth in production compared with other manufacturing industries.

The selected agricultural- and wood products-based industries examined in this issue accounted for $393 billion of value added in 1995 (table 1). That total was 23 percent of all value added in the U.S. manufacturing sector that year. This does not include value added in marketing and transportation activities by firms that handle finished manufactured goods. Clearly, a substantial share of economic activity is linked to agricultural- and forest-based inputs.

These industries used materials worth $496 billion, which was 26 percent of all manufacturing materials. This includes many nonagricultural materials and also "double-counts" some materials. For example, logs are counted as materials for sawmills, and the lumber produced by the sawmills is counted as materials for furniture industries. Nevertheless, value-added industries consume a large quantity of raw materials, and their high share of all manufacturing materials shows that they are relatively materials-intensive compared with other industries.

The importance of materials in their cost structure means that manufacturers of agricultural- and wood-based products are somewhat more likely to locate near their source of raw materials. That often means a rural location. While the majority of value-added activity occurs in urban areas, the share of agricultural- and forest products-based value added in nonmetro areas is relatively large compared with other industries. About 30 percent of value added in five major agricultural- and forest products-based industries (food, tobacco, lumber, paper, and leather products) was in nonmetro areas during 1994 (the most recent year for which we have data on nonmetro shares). In other manufacturing industries, the nonmetro share of value added was less than 17 percent.

Agricultural- and wood products-based industries account for an important part of the nonmetro manufacturing base. Five such industries (food processing, tobacco, lumber and wood products, pulp and paper, and leather products) account for 29 percent of all manufacturing value added in nonmetro counties (table 2). Food processing, with a share of nearly 14 percent, is the largest single nonmetro industry. Lumber and wood products and paper products each account for more than 7 percent. However, a large part of the nonmetro manufacturing base has little or no connection to agriculture or forestry. For example, four large nonmetro industries that have virtually no agricultural linkages (fabricated metal products, industrial machinery, electrical, and transportation equipment)

Table 1

Characteristics of selected value-added industries, 1995

Value-added industries account for over one-fifth of U.S. manufacturing

Item	Value-added industries[1]	Share of all manufacturing
	Billion dollars	Percent
Value added	393	23
Salaries and wages	111	18
Payment to other factors	282	26
Value of materials used	496	26
Capital expenditures	28	22
	Millions	
Employment	4.16	22

[1]Value-added industries include those defined in appendix, "Definitions," p. 69.
Source: U.S. Bureau of the Census, Annual Survey of Manufactures, 1995.

account for a share of value added identical to the share attributed to the five major agricultural- and forest products-based industries.

Capital-Intensive, Modest Levels of Investment

Wages and salaries of $111 billion were paid to 4.16 million persons employed in agricultural- and wood products-based industries in 1995 (table 1). Wages and salaries account for about 28 percent of value added. Wages are relatively low in value-added industries (see "Value-Added Workers Earn Less, Have Less Education Than Other Rural Manufacturing Workers"). Their share of manufacturing wages is only 18 percent, but they account for 22 percent of manufacturing employment. The remaining share of value added is paid to owners of capital (lenders, stockholders, partners, and proprietors) in the form of interest, dividends, and profits; to providers of business services; to corporate officers, whose salaries are not included in the wages and salaries of $111 billion; and to various levels of government in taxes. In addition, some of these dollars may be reinvested as retained earnings. Agricultural- and wood products-based industries have a low ratio of wages to value added compared with the average for all manufacturing (36 percent). This low ratio again reflects the relatively low wages in many of these industries, but it also indicates that many of them are relatively capital intensive. In capital-intensive industries, owners of capital receive a relatively large share of payments to factors of production, and labor receives a smaller share. Manufacturing activities are much more capital intensive

A substantial share of economic activity is linked to agricultural- and forest-based raw inputs. Nonmetro areas have captured a relatively large share, but metro areas claim most of the value-added activity. A large share of the value that is added is paid to owners of capital. New investment is modest, consistent with modest rates of growth in production compared with other manufacturing industries.

Table 2

Shares of rural and urban manufacturing value added, by industry, 1994

Agricultural- and wood products-based industries are an important component of the rural manufacturing base

Industry	Rural	Urban
	Percent	
Primarily agricultural- and wood products-based	**29.3**	**16.3**
Food processing	13.6	10.1
Lumber and wood products	7.4	1.4
Pulp and paper products	7.2	3.1
Leather and leather products	.6	.2
Tobacco products	.5	1.6
Other manufacturing	**70.7**	**83.7**
Industrial machinery and equipment	8.7	10.4
Chemicals	8.5	12.0
Electrical equipment	7.4	10.1
Transportation equipment	6.5	11.9
Fabricated metal products	6.0	6.0
Rubber and miscellaneous plastics	5.9	4.1
Textile products	5.4	1.2
Primary metal products	6.0	3.9
Apparel	4.0	2.0
Printing and publishing	3.7	8.3
Stone, clay, and glass	3.3	2.3
Furniture	2.3	1.3
Instruments	2.3	6.7
Miscellaneous manufacturing	1.3	1.6
Petroleum and coal products	1.1	1.9
All manufacturing	**100.0**	**100.0**

Source: ERS analysis of U.S. Bureau of the Census, special tabulation of *1994 Annual Survey of Manufactures* data.

than other types of value-added activities, such as wholesale-retail, food service, and recreation activities.

Agricultural- and wood products-based industries are adding to their capital at a rate similar to that of other manufacturing industries. Their share of expenditures for new and used capital (purchases of machinery and equipment, plant additions, updates, or expansions) during 1995 was 22 percent, the same as their share of employment and output. Capital expenditures per worker ($6,800) were also about the same as the average for all manufacturing. Capital expenditures are an indicator of investment, which is triggered by industry growth and expansion, as well as the need to replace worn out and obsolete capital.

Value-Added Industries Moderately Growing

Most agricultural- and wood products-based industries have shared in the robust economic growth enjoyed by the U.S. economy during the mid-1990's, but growth has been more rapid for other types of manufacturing. Food processing has grown at a steady rate through the 1990's (fig. 1). Mid-1997 production is estimated to be about 8 percent above its 1992 level. However, the growth rate of food processing has been only about one-third the rate for all manufacturing. In late 1997, total manufacturing production was about 25 percent above 1992 levels. Industries with the most rapid growth are generally technologically sophisticated machinery and equipment industries, in which the United States has a comparative advantage, such as aircraft, computer, and electrical equipment.

Lumber and wood products is a highly cyclical industry, as can be seen by the steep decline in production during the 1990-91 recession and generally greater fluctuation from month to month compared with food processing and all manufacturing (fig. 1). The lumber and wood products industry is influenced by macroeconomic events through its dependence on the housing market. The industry has also been affected by Federal

Figure 1
Indexes of industrial production: Selected value-added industries and all manufacturing, 1990-97
Recent growth in value-added industries has lagged behind overall manufacturing growth

Index (1992=100)
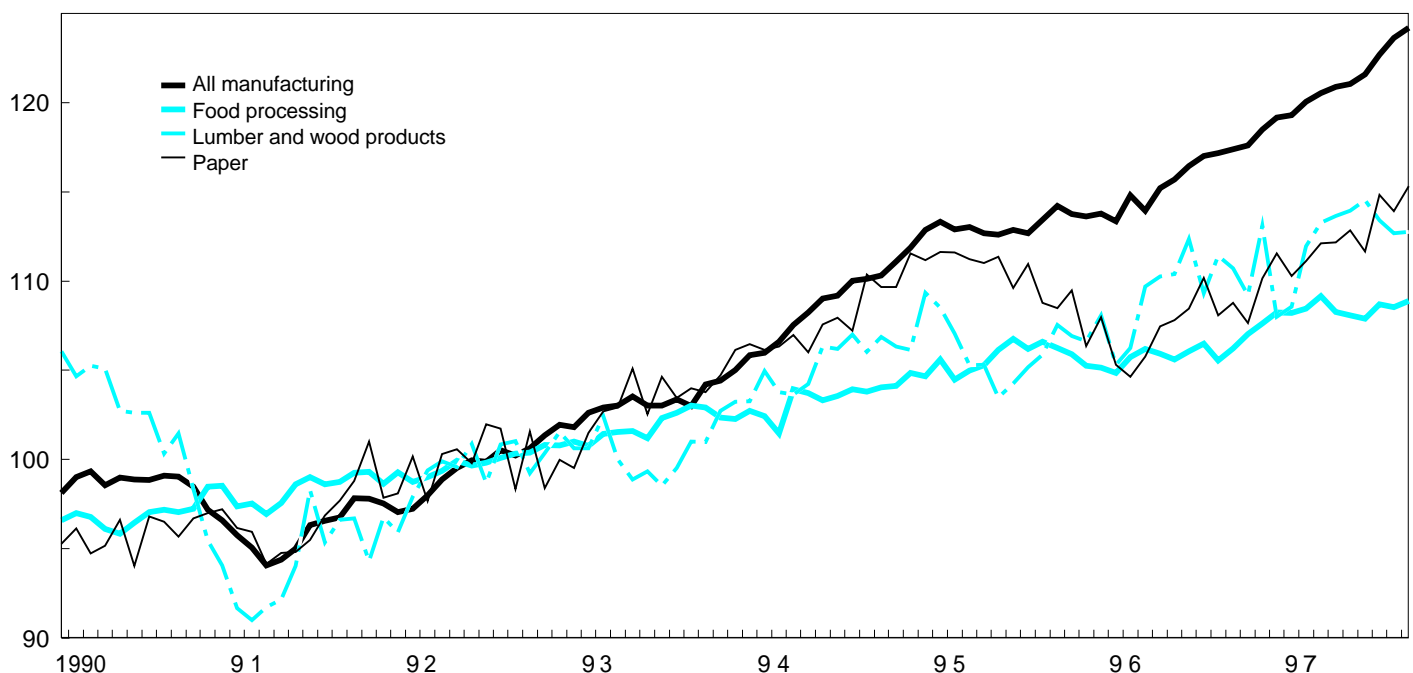
Source: Federal Reserve System Board of Governors.

Government environmental and timber harvesting policies as well as developments in world markets. Since 1992, production in the lumber and wood products industry has grown at a rate similar to that of food processing, also considerably slower than the growth rate for all manufacturing.

Paper products production grew at a rate similar to the rate for all manufacturing until it declined in 1995 and 1996 (fig. 1). Since mid-1996, production has again grown at a rate similar to other industries. By mid-1997, production had returned to the peak levels of early 1995. Lack of growth in the printing and publishing industries has dampened the demand for paper products. A trend toward less packaging stimulated by increased environmental awareness may also have weakened demand. Growth in exports, however, may offset these factors.

Two other industries that use primarily agricultural materials, leather and tobacco products, have shown flat or declining production in the 1990's (fig. 2). Tobacco products production, of course, has faced slow growth in domestic demand and the prospect of even lower demand as proposals for additional excise taxes and antismoking measures are considered. Leather products output has declined steadily in the face of stiff foreign competition.

Furniture, textiles, and chemicals, industries that use agricultural and wood-based materials for a minor share of inputs, have also grown more slowly than other manufacturing industries (fig. 3). Furniture and textiles grew at a rate similar to that of all manufacturing coming out of the 1990-91 recession. In 1995, however, production flattened for furniture and declined sharply for textiles. Chemical production has grown steadily at about half the rate of growth for all manufacturing. *[Fred Gale, 202-694-5349, fgale@econ.ag.gov]*

Figure 2
Indexes of industrial production: Tobacco and leather products, 1990-97
Production of tobacco and leather products has not grown in the 1990's

Index (1992=100)
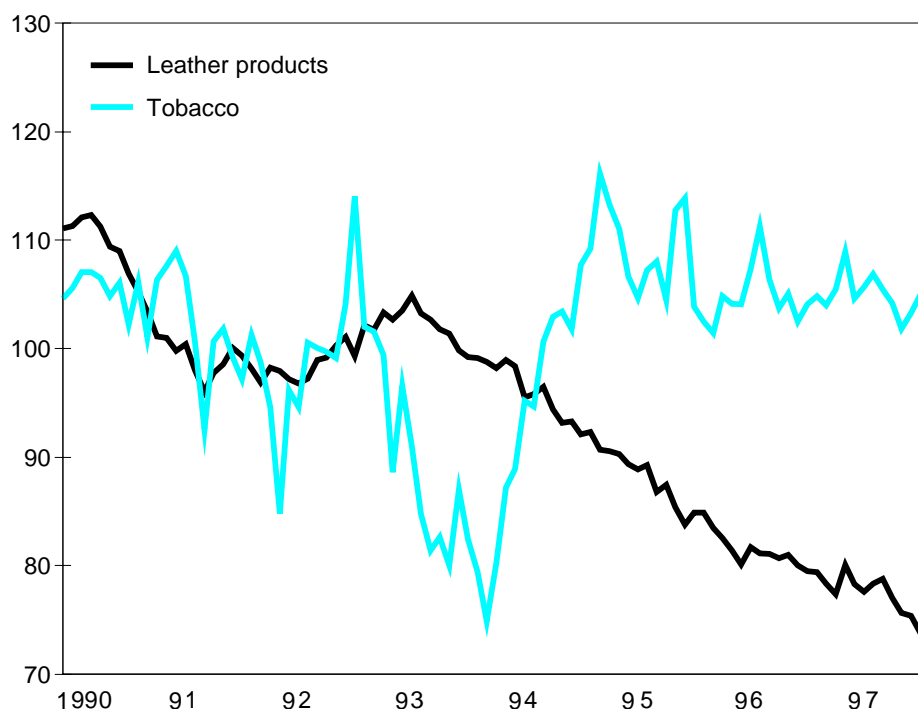
Source: Federal Reserve System Board of Governors.

Figure 3
Indexes of industrial production: Furniture, printing and publishing, chemicals, and all manufacturing, 1990-97
Other industries that use agricultural- and forest-based inputs have also lagged in production growth

Index (1992=100)
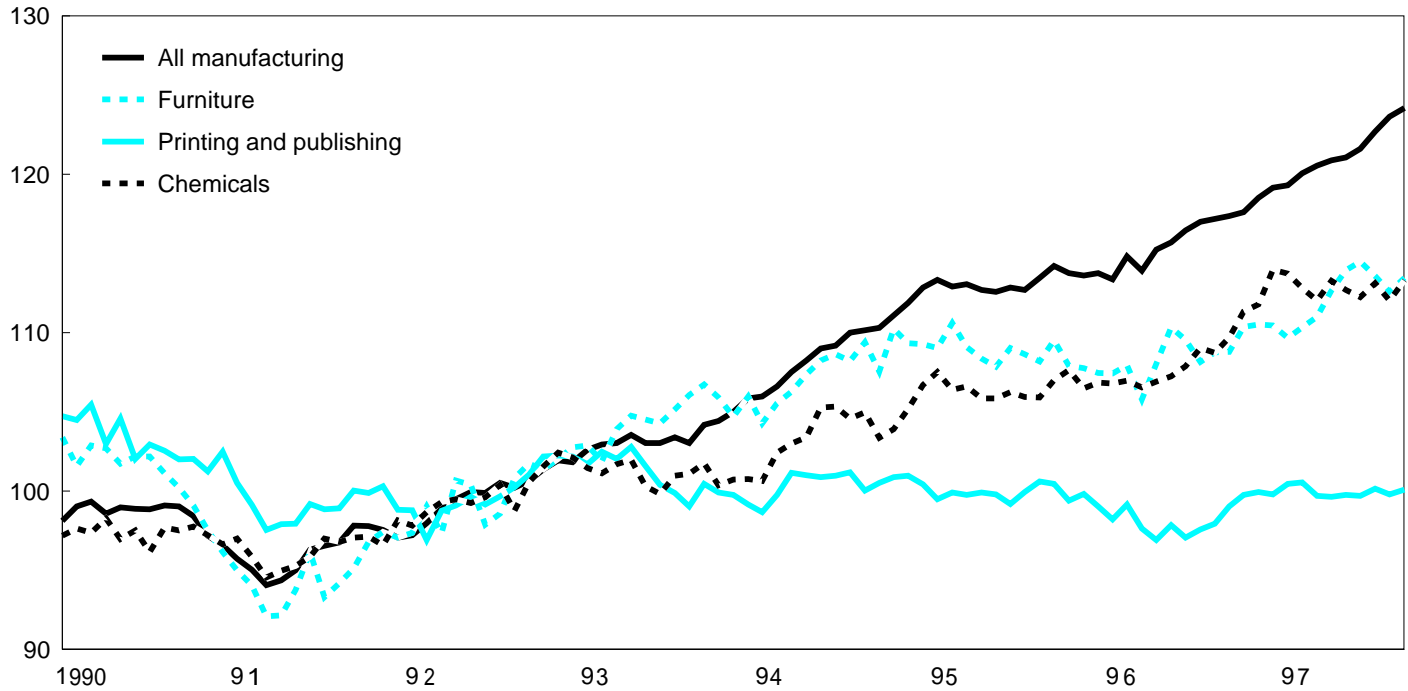
Source: Federal Reserve System Board of Governors.

Most Value-Added Manufacturing Increased Its Attachment to Rural Areas During 1989-94

Value-added manufacturing grew faster in nonmetro areas than in the Nation as a whole during 1989-94. Meat processing led employment growth in the farm-related sectors. In each of the forest-related sectors, the number of establishments increased while employment fell. Despite lower employment in some sectors, both farm- and forest-related value-added manufacturing had spread to more nonmetro counties by 1994.

Value-added manufacturing grew much faster in nonmetro areas than it did nationally during 1989-94. Nonmetro value-added manufacturing establishments increased by 11.3 percent and the number of their employees increased 5.9 percent. Nationally, the number of value-added establishments grew 8.1 percent, and the number of employees declined by 1.9 percent (table 1). With the number of value-added establishments growing faster than the number of employees in nonmetro areas (and more establishments nationally despite employment declines), the average employment size of establishments declined. The forest-related value-added establishments accounted for most of this decline in employment size. Farm-related value-added establishments increased their average employment size in nonmetro areas while decreasing their employment size nationally.

Value-added industries contributed to rural employment growth more than other manufacturers during 1989-94. While other nonmetro manufacturing increased the number of establishments faster than nonmetro value-added manufacturing did, the number of employees grew much faster in nonmetro value-added manufacturing than in other nonmetro manufacturing. Farm-related industries accounted for much of the gain. The following discussion delves into more detailed industrial trends to help explain the overall growth and identify stronger and weaker value-added sectors in terms of national employment trends and their attachment to nonmetro areas.

Table 1

Total, manufacturing, and value-added establishments and employees

Farm- and forest-related manufacturing are growing faster in nonmetro areas than elsewhere and are more concentrated in rural areas than is other manufacturing

Industry	Establishments		Employees	
	1994	Change, 1989-94	1994	Change, 1989-94
	Number	Percent	Number	Percent
All industries	6,507,713	6.6	96,629,396	5.6
Manufacturing	375,249	6.2	16,813,485	-8.1
Farm and forest value-added	110,726	8.1	4,030,354	-1.9
Farm value-added	22,357	3.6	1,728,212	-1.1
Forest value-added	88,369	10.7	2,302,142	-2.5
All nonmetro industries	1,252,490	7.9	14,719,655	11.1
Manufacturing	80,784	13.3	3,982,491	1.2
Farm and forest value-added	34,114	11.3	1,346,355	5.9
Farm value-added	6,167	4.4	572,978	8.5
Forest value-added	27,947	15.5	773,377	3.5
	Percent	Percentage points	Percent	Percentage points
Share of all industries in nonmetro areas	19.2	.2	15.2	.8
Manufacturing	21.5	1.4	23.7	2.2
Farm and forest value-added	30.8	1.1	33.4	2.4
Farm value-added	27.6	.2	33.2	2.9
Forest value-added	31.6	1.3	33.6	2.0

Source: Calculated by ERS using data from County Business Patterns files enhanced by Claritas, Inc.

Meat Products Manufacturing Led Employment Growth Among Farm Value-Added Industries

Within farm-related value-added manufacturing, the meat-products sector (meat packing, sausages and other prepared meats, and poultry slaughtering and processing) employed the largest number of workers and had much faster growth in employment than the other sectors (table 2). All three industries in the meat-products sector added employees, but poultry slaughtering and processing employment grew four to six times as fast as in the other industries (app. table 3). Continuing consumer demand for lower cholesterol meats and the poultry industry's introduction of an increasing array of red-meat substitutes (for example, turkey bacon and burgers and chicken bologna) have fueled these employment trends.

The only other farm-related sector that increased employment by even 5 percent over the 5-year period was grain mills. This sector is a varied group of industries from flour, rice, or corn milling to breakfast cereals and flour mixes and doughs to pet food and other animal feeds. The prepared flour mixes and doughs industry increased employment 43 percent, accounting for most of this sector's growth (app. table 3). Consumer demand for more processed, quickly preparable foods undoubtedly has fueled that increase.

Table 2

Farm-related value-added manufacturing establishments and employees
Meat products is the fastest growing employer and the most rural of the farm-related manufacturers

	Establishments		Employees	
Industrial sectors	1994	Change, 1989-94	1994	Change, 1989-94
	Number	Percent	Number	Percent
Meat products	3,136	2.9	420,218	17.0
Dairy products	1,941	-12.1	134,702	-4.6
Canned, frozen, and preserved fruits, vegetables, and food specialities	2,003	6.3	187,624	.7
Grain mill products	2,650	5.3	107,936	5.2
Bakery products	3,346	13.0	219,559	1.2
Sugar and confectionery products	1,141	3.5	88,904	-2.7
Fats and oils	511	-9.1	25,940	-11.1
Beverages	2,084	.1	139,273	-9.1
Selected miscellaneous food preparations	2,306	16.4	103,031	1.4
Tobacco products	117	-16.4	34,695	-23.9
Selected cotton or wool fabric or yarn manufacturing	1,310	13.2	174,720	-14.1
Leather products and leather and sheep-lined clothing	1,812	-6.8	91,610	-21.7
	Percent	Percentage points	Percent	Percentage points
Shares of industry sector in nonmetro counties				
Meat products	39.7	.9	52.3	3.4
Dairy products	33.5	-.3	27.8	1.1
Canned, frozen, and preserved fruits, vegetables, and food specialities	25.8	1.5	32.8	3.5
Grain mill products	46.6	-.9	34.5	2.6
Bakery products	10.2	.2	12.8	1.1
Sugar and confectionery products	20.9	1.1	21.1	1.9
Fats and oils	36.4	2.9	33.5	3.5
Beverages	20.5	-.4	11.8	-.4
Selected miscellaneous food preparations	16.5	1.3	13.1	1.3
Tobacco products	18.8	.2	12.8	2.6
Selected cotton or wool fabric or yarn manufacturing	33.3	.4	51.9	5.1
Leather products and leather and sheep-lined clothing	26.9	2.2	39.7	1.2

Source: Calculated by ERS using data from County Business Patterns files enhanced by Claritas, Inc.

On the negative side, manufacturers of fats and oils, tobacco products, selected cotton and wool fabrics and yarns, and leather products each shed at least 10 percent of their workers during 1989-94. The industries within fabric and yarn manufacturing that account for the sector's decline are broadwoven cotton fabric mills and yarn spinning mills (app. table 3). While they still are the two dominant employers among the five fabric and yarn industries we analyzed, they each shed a quarter of their workers during the 5 years. Despite employment downsizing, the broadwoven cotton fabric mills added establishments during the period. Increases in mechanization, computerization, and product specialization may have played a role in decreasing the need for workers while providing opportunities for new establishments.

Nonmetro Areas Increased Their Shares of Farm-Related Value-Added Employment

Nonmetro areas maintained or increased their share of jobs in almost all farm-related value-added manufacturing sectors, even among sectors with large increases or declines in employment. Nonmetro areas gained 3.4 percentage points in the growing meat products sector, pushing their share of the industry to 52.3 percent (table 2). Their share of selected cotton and wool fabric and yarn manufacturing also increased to over half, while employment in that sector declined. Nonmetro areas also gained in their shares of fats and oils and tobacco manufacturing employment as those sectors shrank. The only sector in which the nonmetro share of employment declined was in beverage manufacturing and that was by less than 1 percentage point. (Nonmetro shares of establishments and employees at the detailed industry level are shown in app. table 4.)

Variation in the nonmetro shares of sectors broadly reflect the closeness of each industry's ties to retail market or inputs. For example, nonmetro areas contain low shares of bakery, beverages, and miscellaneous food preparations industries because they are tightly tied to consumer demand, and most consumers are in urban areas. Bakery-products manufacturers are located near population centers to minimize transportation time for their perishable products. Beverage manufacturing adds much of its weight, from water and containers, at the manufacturing site, making it more economical to locate close to large retail markets. About a third of the employment in the selected miscellaneous food preparations we analyzed is in potato and corn chip and similar snack manufacturing, another set of products that are relatively perishable and fragile, also making retail markets an important establishment-siting factor.

Industries with processing that reduces the weight of inputs tend to locate closer to inputs than to the retail market. The meat-packing industry is a prime example. With the production process shifted to boxed beef (cuts of beef and frozen hamburger patties and rolls) rather than whole carcasses, location closer to cattle and hog producers has become more attractive. Major shifts in the ownership of meat packing to a few major firms and from unionized to nonunionized labor have also affected the industry's location, making nonmetro areas more attractive. (See the June 1994 issue of *Rural Development Perspectives* for articles on the red-meat and poultry industries and their changing labor forces.)

Selected fabric and yarn manufacturers are also concentrated in nonmetro areas. Their nonmetro locations are at least partly due to lower land prices for large factories, their production of intermediate products that do not go directly into the retail market, and the legacy of the movement of much of the Northeast textile and apparel industries into lower wage, nonunionized, smaller southern communities after the turn of the century.

All Forest-Related Manufacturing Sectors Added Establishments, but Shed Employees

Trends for forest-related value-added manufacturers were different than those of the farm-related manufacturers during 1989-94. All five of the forest-related sectors we analyzed (lumber and wood products, paper and allied products, selected wood furniture, selected printing and publishing, and selected chemicals and allied products) added establishments, but shed employees during the 5-year period (table 3). With falling employment

and increasing numbers of establishments, the average number of employees per establishment declined in all the sectors.

The selected chemicals and allied products industries we analyzed are cellulosic man-made fibers and gum and wood chemicals. The large decline in employment in this sector was in the cellulosic man-made fibers industry (app. table 5). The gum and wood chemicals industry added a few employees during the period. Employment declines in the other four, much larger, sectors were more modest, in the 2- to 5-percent range.

Among the industries in the lumber and wood products sector, only structural wood members and mobile home manufacturers had sizable growth in employment, 19 and 13 percent (app. table 5). Hardwood dimension and flooring mills and wood kitchen cabinet manufacturers modestly increased employment, 3 and 0.5 percent. All of the other industries in this sector shed employees, with most dropping at least 10 percent of their employees during the period. While the mobile home industry gained employees, it lost establishments, increasing its average employment per establishment. Several other lumber and wood-products industries lost establishments, but they were also shedding employees, so their average establishment size did not change much.

The paper and allied products sector also includes a wide array of industries (app. table 5). Eight of its industries accounted for the sector's overall loss of employees. Although paper mills did not have the highest percentage loss of employees, they are by far the largest industry in the paper and allied products sector and accounted for a large share of the sector's employment loss. Setup paperboard boxes (such as the boxes, some with metal corners, used to store photographs or documents) and stationery, tablets, and related products lost over 20 percent of their workers, but those two industries are relatively small. The paper industry with the fastest employment growth was coated and laminated packaging paper and plastic films. Employment in this industry increased 8 percent, and the number of establishments increased 51 percent. It is a small industry, however, and whether the packaging paper or the plastic film is generating the growth is not clear.

Table 3

Forest-related value-added manufacturing establishments and employees by sector
All sectors added establishments while shedding workers; nonmetro areas increased their shares of both establishments and workers

Industrial sectors	Establishments		Employees	
	1994	Change, 1989-94	1994	Change, 1989-94
	Number	Percent	Number	Percent
Lumber and wood products, except furniture	37,389	13.3	694,473	-2.7
Paper and allied products	6,467	2.8	622,410	-1.5
Selected wood furniture	6,502	8.3	277,008	-5.1
Selected printing and publishing industries	37,919	10.0	698,895	-1.6
Selected chemicals and allied products	92	9.5	9,356	-29.1
Shares of industry sector in nonmetro counties				
	Percent	Percentage points	Percent	Percentage points
Lumber and wood products, except furniture	55.5	.8	55.7	3.3
Paper and allied products	16.3	.8	27.8	1.0
Selected wood furniture	22.3	2.4	38.0	3.1
Selected printing, publishing, and allied industries	12.3	.8	14.8	1.1
Selected chemicals and allied products	53.3	6.8	45.1	17.2

Source: Calculated by ERS using data from County Business Patterns files enhanced by Claritas, Inc.

Four of the five wood furniture manufacturing industries we analyzed shed workers during 1989-94. Only the upholstered wood furniture industry gained employees, but by a meager 2 percent. Wood office furniture manufacturing shed 25 percent of its workers and was the only industry to lose establishments. Wood television, radio, phonograph, and sewing machine cabinets manufacturing lowered employment by 13 percent but increased the number of establishments by 42 percent, suggesting that smaller, more specialized establishments are needed to respond to the unique demands of buyers in this niche market.

Of the four printing and publishing industries we selected for analysis, only book printing increased employment. The commercial printing industry dominates this group and had flat employment, dropping only 0.4 percent. The two industries that accounted for the group's overall employment decline are manifold business forms and blankbooks, looseleaf binders, and devices. Those two industries added establishments as they lost employees. They may be specializing in response to computer-generated forms and computerized information storage cutting into the demand for their products.

Nonmetro Areas Increased Their Shares of Forest-Related Value-Added Employment

Nonmetro areas increased their shares of both establishments and employees in all five forest-related manufacturing sectors. Nonmetro areas increased their share of lumber and wood products to over 50 percent of employees and 42 percent of establishments (table 3). In the selected chemical industries, the nonmetro share of employees jumped to 45 percent as most of the employment losses were in metro areas. The nonmetro share of this sector's establishments increased to 53 percent.

Some forest-related value-added manufacturing industries are closely tied to commercial users who are concentrated in larger markets. For example, nonmetro areas have low shares of the selected printing and publishing sector because commercial printing does most of its work on a contract basis for businesses. Other industries, such as lumber and furniture, are much more likely to be located in nonmetro areas, closer to raw materials, because they reduce the weight of inputs and sell the same products to a wide range of businesses. For example, the lumber industry sells dimension lumber to construction firms as well as to exporters and retail lumberyards, and the furniture industry sells the same sofa or chair to numerous furniture retailers. (See app. table 6 for nonmetro shares of establishments and employees at the detailed industry level.)

Most Farm- and Forest-Related Industries Spread to More Counties

Along with knowledge of the growth or decline in the numbers of farm- and forest-related manufacturing establishments and employees, communities considering these industries as possible development options need to know whether value-added industries tend to stay in one place or spread to other places. Table 4 shows the net change in the number of counties with at least one establishment in the industrial sector. Among the farm-related sectors, dairy products, fats and oils, beverages, and tobacco products became more geographically concentrated during 1989-94. Tobacco-products manufacturing was already quite concentrated in 1989 and shrank to locations in only 74 counties by 1994. The other eight sectors spread out to more counties. Even the selected fabric and yarn manufacturers and the leather-goods manufacturers were in more counties in 1994 than they had been in 1989, despite their sizable employment declines.

Nonmetro counties experienced geographic contraction in the same four farm-related sectors as all counties did. In most of the geographically expanding industries, nonmetro counties disproportionately gained, capturing a larger share of the counties with at least one establishment in 1994 than they had held in 1989.

Within forest-related manufacturing, all five sectors were in more counties in 1994 than in 1989. Nearly 80 percent of all 3,141 counties and 76 percent of the 2,305 nonmetro counties have at least one firm involved in lumber and wood-products manufacturing. The

selected wood furniture manufacturers expanded to more counties by the largest percentage, nationally and among nonmetro counties. All sectors geographically expanded more rapidly in nonmetro counties, increasing the nonmetro shares of all counties with at least one forest-related manufacturer.

Implications for Rural Development

The trends in farm- and forest-related value-added manufacturing during 1989-94 generally favored rural areas. In nearly all the industries we analyzed, nonmetro areas increased their shares of establishments and employees, even in most of the industries with declining employment. Most of the farm-related and all of the forest-related sectors also spread to more counties by 1994, tending to favor rural locations.

Some rural communities lost establishments and jobs in these industries as firms closed, relocated, or downsized. The net gains in establishments and counties containing these industries, however, suggest that more rural communities have had the ability to start new or attract relocating farm- and forest-related manufacturing firms. Whether a specific rural community will find one or more of the value-added industries beneficial to its economic development depends on many factors. Among them are whether the community's location within the inputs-versus-market spectrum matches the industry's locational

Table 4

Counties with at least one establishment in the farm- or forest-related value-added manufacturing sectors

Nearly all farm- and forest-related value-added manufacturing sectors expanded to more nonmetro counties between 1989 and 1994

Industrial sectors	Total		Nonmetro		Nonmetro share of counties with at least one establishment	
	1994	Change, 1989-94	1994	Change, 1989-94	1994	Change, 1989-94
	Number	Percent	Number	Percent	Percent	Percentage points
Farm-related sectors:						
Meat products	1,324	5.9	801	6.5	60.5	0.3
Dairy products	762	-8.1	350	-9.3	45.9	-.6
Canned, frozen, and preserved fruits, vegetables, and food specialities	703	8.3	317	13.6	45.1	2.1
Grain mill products	1,215	4.8	729	3.7	60.0	-.7
Bakery products	755	8.5	271	17.8	35.9	2.8
Sugar and confectionery products	497	5.3	186	11.4	37.4	2.0
Fats and oils	349	-5.2	162	-2.4	46.4	1.3
Beverages	704	-4.9	293	-9.0	41.6	-1.9
Selected miscellaneous food preparations	716	13.8	287	21.6	40.1	2.6
Tobacco products	74	-12.9	19	-9.5	25.7	1.0
Selected cotton or wool fabric or yarn manufacturing	502	18.4	221	20.8	44.0	.9
Leather products and leather and sheep-lined clothing	633	5.1	315	5.0	49.8	-.1
Forest-related sectors:						
Lumber and wood products, except furniture	2,577	3.6	1,765	4.3	68.5	.4
Paper and allied products	1,146	3.2	543	4.2	47.4	.4
Selected wood furniture	1,262	8.2	636	11.8	50.4	1.6
Selected printing and publishing	2,205	4.9	1,410	6.4	63.9	.9
Selected chemicals and allied products	72	1.4	37	12.1	51.4	4.9

Source: Calculated by ERS using data from County Business Patterns files enhanced by Claritas, Inc.

needs, whether the community must offer tax breaks or industrial park investments to attract the industry, whether the industry pays wages as high as or higher than other industries the community could attract, and whether the industry can find sufficient local workers or must recruit from outside the community. *[Linda M. Ghelfi wrote this article, but has since moved to research on food assistance. Please contact Fred Gale, 202-694-5349, fgale@econ.ag.gov, if you have questions regarding value-added industries.]*

Value-Added Workers Earn Less, Have Less Education Than Other Rural Manufacturing Workers

Value-added industries employed one-third of all rural manufacturing workers in 1996. Value-added workers generally have lower occupational status and less education than other manufacturing workers, which is reflected in their lower average weekly earnings. Wages in value-added industries have grown only slightly overall during the 1990's, but more rapidly for women.

Approximately 1.5 million workers, 33 percent of the rural manufacturing wage and salary work force, were employed in value-added industries in 1996, according to data from the Current Population Survey (CPS). Manufacturing provides 18 percent of all rural jobs. Due to limitations in the CPS, these industries are delineated according to a broader definition of value-added than the one used elsewhere in this issue (see "Definitions" appendix). Value-added workers form a particularly large share of the manufacturing work force in the South, where lumber, furniture, and paper are key industries throughout much of the region. These industries are far less important to the Midwestern rural economy, and value-added workers are a smaller share of the work force there. Since value-added industries tend to use raw timber and agricultural products as inputs, their employment share in rural areas is larger than in urban areas. Despite the pressures of an increasingly competitive international market and the introduction of labor-saving technology, value-added industries' share of total rural manufacturing employment has remained steady since 1990.

Value-Added Workers Have Less Education, Lower Occupational Status

Rural value-added industries rely more on less-educated, male, and Hispanic workers than do other manufacturing industries. Value-added manufacturing workers are less likely to be women, for example, but more likely to be Hispanic (table 1). Two-thirds of rural Hispanics employed in manufacturing work in value-added industries, compared with one-third of all rural manufacturing workers. Rural value-added manufacturers also require

Table 1

Selected characteristics of rural value-added and other manufacturing workers
Value-added industry workers are less educated and more likely to be male and Hispanic than other manufacturing workers

Category	Value-added	Other manufacturing
	Percent	
Men	72	64
Women	28	36
Age:		
16-24	14	14
25-60	81	82
Over 60	5	4
Black	14	12
Hispanic[1]	10	3
White	85	87
Less than high school	24	15
High school[2]	71	75
College	5	10
Managerial, professional, technical[3]	16	25
Craft	23	20
Other blue collar, service	61	55

[1]Hispanics may be of any race. [2]Includes workers who attended college but did not complete a 4-year program. [3]Includes sales, clerical, and administrative support workers.
Source: Calculated by ERS using data from the 1996 Current Population Survey.

relatively fewer managerial, professional, and technical workers (14 percent vs. 25 percent in other manufacturing). Accordingly, value-added workers have lower average levels of educational attainment. They are less likely to have a high school diploma or college degree than other rural manufacturing workers. The same patterns appear to hold for metro value-added workers as well, indicating that relatively low education and occupational attainment is endemic to value-added industries, not primarily a result of the location of high-skill jobs in cities.

Value-Added Earnings Lower Due to Work Force Composition

In keeping with lower levels of education and occupational status, value-added wage and salary workers in rural areas earn less than other manufacturing workers. However, they earn much more than service workers (table 2). Weekly earnings for value-added workers in 1996 averaged $451. Other manufacturing workers earned 7 percent more ($483), while service workers earned about 14 percent less ($388). Most of the difference between value-added and other manufacturing pay can be traced to the educational composition of the two work forces. College graduates 25 years and older, for example, earn about the same amount in both kinds of manufacturing—$818 in value-added compared with $809 in other manufacturing.

Differences in weekly earnings between value-added and service workers, on the other hand, are due largely to the greater incidence of part-time work among service workers. Most rural value-added workers (95 percent), like other manufacturing workers, are employed full-time, compared with just 72 percent of rural workers in service industries. When full-time workers only are compared, the 18-percent wage gap in favor of value-added workers reverses to a 4-percent gap in favor of service workers. The change is less surprising than it first appears. The service sector is highly diverse. Many of its workers are quite well educated and enjoy high-status occupations compared with manufacturing workers. Other jobs typically found in the service sector, such as restaurant and sales clerk jobs, require even less skill than those in value-added manufacturing.

Rural value-added workers earn about 20 percent less than their urban counterparts. Unlike the comparison with other rural workers, the difference is attributable to greater monetary rewards for the same level of education, as well as to higher urban education and skill levels. But the returns to additional education are also larger in urban areas. For example, value-added workers with less than a high school diploma earn about the same amount in urban and rural labor markets. High school graduates earn about 10 percent more in urban labor markets, however, while college graduates earn 15 percent more.

Table 2

Average weekly earnings of value-added and other selected workers, 1996
Differences in educational composition explain much of the difference between rural value-added and other manufacturing workers

Category	Rural value-added	Other rural manufacturing	Rural services	Urban value-added
	Dollars			
All wage and salary workers	451	483	388	539
Less than high school	379	375	265	368
High school[1]	485	495	393	534
College	818	809	630	944
Full-time	462	498	479	556

[1]Includes workers who attended college but did not complete a 4-year program.
Source: Calculated by ERS using data from the 1996 Current Population Survey.

Comparisons using only average demographic or earnings statistics for valued-added workers ignore the diversity within the value-added industry group (fig. 1). Paper industry workers, for example, earn well above the average for all manufacturing industries ($559), and have relatively well-educated workers, but food processing employees are less educated and earn considerably less than the average ($408). Furniture and lumber industry wages are closer to the manufacturing average.

Value-Added Earnings Grew Rapidly for Women in the 1990's

The rural value-added work force has changed during the 1990's, but very slowly. Relatively more workers had a high school diploma by 1996. Also, the current concentration of Hispanics reflects an influx of these workers since the beginning of the decade. Earnings in rural value-added industries changed little during the 1990's, registering 1.5 percent real growth between 1990 and 1996 (table 3). This rate was similar, however, to the 1.8 percent change for the rural work force as a whole. Men and women workers had sharply different experiences over the 1990-96 period, as men's earnings remained essentially unchanged while women's earnings rose 9 percent. Women's rapid rise partly reflects their movement up the career ladder to better paying jobs, as well as faster earnings growth in many nonproduction-related occupations, where women are disproportionately employed. Earnings similarly diverged between high-status white collar workers, whose earnings fell, and many workers in blue collar and support occupations, where earnings rose moderately. *[Robert Gibbs, 202-694-5423, rgibbs@econ.ag.gov]*

Figure 1

Average weekly earnings by value-added industry, 1996

Paper industry workers earn 37 percent more than those in food processing
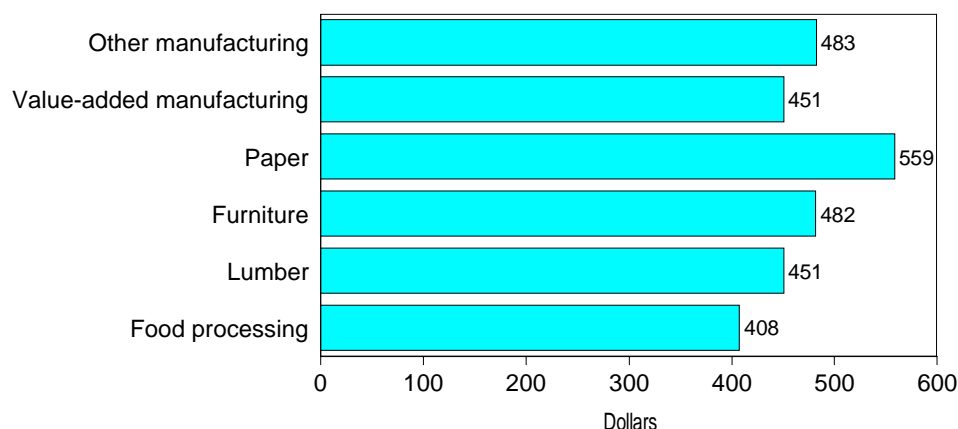
Source: Calculated by ERS using data from the 1996 Current Population Survey.

Table 3
Change in average weekly earnings for rural value-added workers, 1990-96
Women's earnings rose much faster than men's, as was true for the overall rural work force

Category	1990	1996	Change, 1990-96
	1996 dollars		Percent
All wage and salary workers	444	451	1.5
Men	488	485	-.7
Women	333	363	9.1
Black	324	342	5.6
Hispanic[1]	312	330	5.8
White	469	470	.2
Less than high school	372	379	1.9
High school[2]	482	485	.6
College	800	818	2.2
Managerial, professional	832	788	-5.4
Technical, sales, clerical[3]	455	453	-.4
Craft	495	492	-.7
Other blue collar, service	380	396	4.3

[1]Hispanics may be of any race. [2]Includes workers who attended college but did not complete a 4-year program. [3]Includes clerical, sales, and administrative support occupations.
    Source: Calculated by ERS using data from the 1996 Current Population Survey.

Value-Added Manufacturing Has Strong Local Linkages

The local economic linkages of value-added manufacturing plants are relatively strong, due to their purchases of materials from local farms and businesses.

In planning a local value-added development strategy, one must understand the location decisions and purchasing patterns of various types of processors. Value-added industries tend to have strong backward linkages with local suppliers. This is a key component of the value-added development strategy. A manufacturing plant that buys its materials locally provides existing businesses and farms with a nearby customer and may attract new businesses to locate in the community. By adding value to locally produced commodities, plants that purchase locally become more closely integrated into the local economy and have a greater local impact than a plant that has materials shipped in from elsewhere.

Analysis of the ERS Rural Manufacturing Survey (see "Data Sources" appendix) shows that, on average, nonmetro plants in value-added industries purchase 45 percent of their materials and inputs locally (within a 1-hour drive), while plants in other industries reported an average of 28 percent local purchases. About 48 percent of nonmetro value-added plants buy at least half of their materials locally, compared with only 28 percent of other plants. Local purchases are a key ingredient for a successful value-added rural development strategy.

Value-added plants vary considerably in their propensity to purchase inputs locally. Forty-two percent of nonmetro value-added plants purchase less than 25 percent of materials locally, while about 35 percent purchase 75 percent or more of materials locally (fig.1). Factors that affect local purchasing include the type of industry, size, and type of plant. Sawmill operations locally buy an average of 70 percent of their inputs. The average is 50 percent for plants that make wood containers, and about 30 percent for millwork-plywood and for wood buildings-mobile home manufacturers. Pulp and paper mills tend to do less local purchasing than other types of wood products industries, locally buying about 25 percent of materials. Food processors' average local purchasing varies between 40 and 60 percent for most industries, but is as low as 8 percent for bakery products and

Figure 1
Local purchasing by nonmetro value-added and other manufacturing plants
Plants in value-added industries are more likely to purchase materials locally
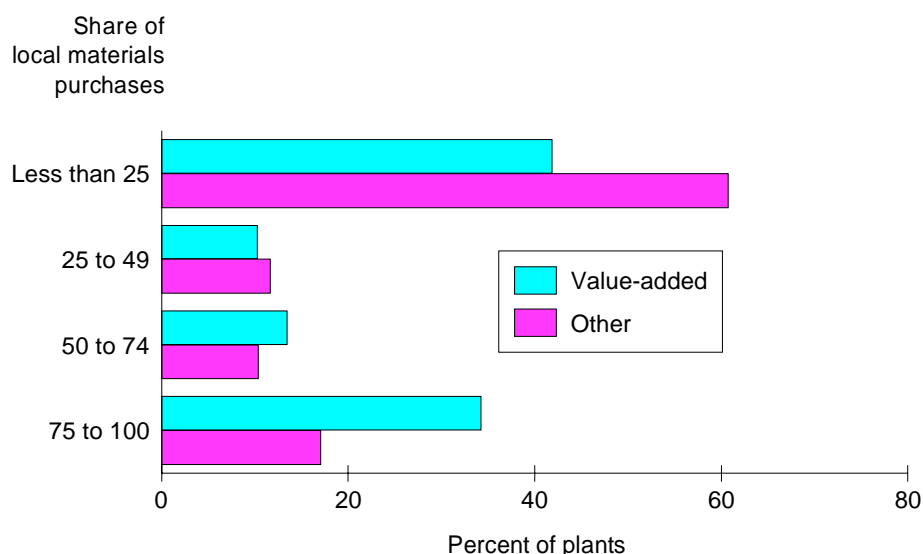
Source: ERS analysis of 1996 Rural Manufacturing Survey.

as high as 64 percent for fats and oils. As might be expected, industries that process raw materials (logs or agricultural commodities) are the most likely to purchase local materials (fig.2).

Local Purchases Increase Local Impact

While the economic impact of a manufacturing plant is often measured by the number of jobs it provides, considering its local linkages can give a broader assessment of a plant's impact. Local purchases of materials are much larger than salaries and wages for many food processing, logging, and sawmill operations. For example, ERS estimates that an average meat-packing plant with 370 jobs spent $7.6 million on salaries and wages and $32.5 million on materials purchased locally in 1995 (table 1). In this case, the primary stimulus to the local economy provided by the plant may be its purchases of raw materials from local businesses and farms, rather than the jobs directly created by the plant. In contrast, an average cotton fabric mill with 221 jobs spent about $4.3 million on salaries and wages, but only $1.5 million on local materials purchases. Meat-packing plants appear to have a much more extensive impact on the local economy through the strength of their backward linkages than do cotton fabric mills. The average meat-packing plant spent $108,500 per job on salaries, wages, and materials, compared with only $26,000 per job spent by the average cotton fabric mill.

Comparison of value-added industries shows that food processing and primary wood products industries have the highest spending per job, because they are materials-intensive and locally purchase a large share of their materials. The highest spending per job is by fats and oils processors, manufacturers of dairy products, red-meat packers, grain mills, logging operations, and sawmills. Red-meat-packing plants spend twice as much as poultry-processing plants on a per job basis because of their higher wages and greater expenditures on materials. Labor-intensive industries, such as textiles and leather products, have the lowest spending per job. Spending per job in other value-added industries is comparable to levels in other manufacturing industries, where the average generally ranges between $40,000 and $60,000 per job. Note that this measure excludes some important spending that contributes to the local economy, such as tax payments, purchases of business services, and construction expenditures.

Figure 2
Average local purchases by nonmetro value-added industry
Industries that process raw agricultural materials and logs are most likely to purchase local materials
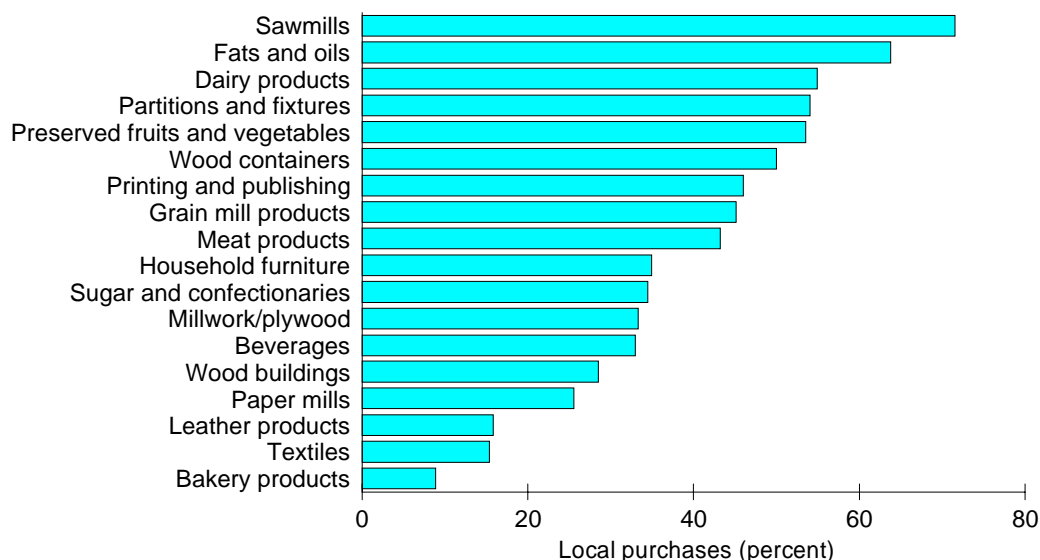
Source: ERS analysis of 1996 Rural Manufacturing Survey.

Plant Size and Local Ownership Can Affect Local Purchasing

Other factors can influence the propensity to purchase locally. Some economic development experts recommend a strategy based on smaller, locally owned plants because they are believed to have stronger local linkages. Larger plants tend to buy a smaller proportion of their materials locally because their large input requirements may not be met by local suppliers and larger plants may be more aware of nonlocal sources. This is the case for sawmills, where small operations (less than 100 employees) locally purchase an average of 74 percent of materials, and large operations (over 500 employees) locally purchase only 28 percent. Many value-added industries do not follow this pattern. For example, among grain mills, local purchasing averages between 50 and 60 percent for plants of all sizes. For millwork/plywood mills, the largest plants have higher average local purchasing propensity than plants of other sizes. Even in industries where larger

Table 1

Estimated local expenditures by nonmetro value-added manufacturing plants, 1995

Local purchasing increases the local impact by raising local spending per job

Industry	SIC[1]	Local purchases[2]	Salaries and wages	Jobs	Local spending per job
		—Million dollars—		Number	Dollars
Meat packing	2011	32.5	7.6	370	108,500
Poultry processing	2015	15.4	7.0	467	48,100
Dairy products	202	12.7	1.9	91	160,600
Preserved fruits and vegetables	203	12.8	3.8	229	72,500
Grain mill products	204	4.4	1.2	53	105,200
Bakery products	205	.6	4.6	208	24,900
Sugar and confectionery	206	10.1	4.3	236	60,900
Fats and oils	207	25.7	2.1	86	323,600
Beverages	208	3.4	2.1	88	62,700
Broadwoven fabric, cotton	221	1.5	4.3	221	26,000
Yarn and thread mills	228	5.2	5.3	263	39,600
Logging	241	6.9	1.6	80	105,600
Sawmills and planing mills	242	4.7	1.2	63	94,100
Millwork, plywood, and structural members	243	2.1	1.5	78	46,400
Wood containers	244	.6	.6	46	27,500
Wood buildings and mobile homes	245	2.0	2.2	93	45,300
Wood household furniture	251	2.6	2.7	148	36,300
Other furniture	252-9	6.2	2.0	92	89,400
Pulp and paper mills	261-3	9.0	11.3	326	62,200
Paperboard containers and boxes	265	3.2	2.2	91	59,000
Miscellaneous converted paper products	267	1.4	2.8	122	34,200
Publishing/printing books, etc.	272-4	1.7	4.7	179	35,900
Commercial printing	275	.9	1.2	46	45,400
Other printing	276-9	2.6	7.1	294	33,100
Leather products	313-9	1.5	3.6	201	25,300

[1]Standard Industrial Classification code. [2]Average materials expenditures multiplied by average percent local purchases.

Source: Estimated by ERS. All data are for 1995, not adjusted for inflation. Local purchasing propensity, production worker wages, and average number of jobs are from 1996 Rural Manufacturing Survey. Materials expenditures and nonproduction worker salaries are from 1995 Annual Survey of Manufactures.

plants locally buy a smaller proportion of their inputs, the larger volume of purchases by large plants means that large plants still locally spend more dollars than smaller plants.

In wood products and furniture industries, branch plants of larger firms tend to purchase fewer local inputs than firms that have only one plant. Textile plants that use just-in-time manufacturing techniques tend to purchase a higher percentage of local materials. Plants also tend to buy more locally when a large number of related firms in the same industry are located nearby. These factors should also be considered when forming a value-added development strategy. *[Fred Gale, 202-694-5349, fgale@econ.ag.gov]*

Investment Patterns Indicate Modest Expansion by Value-Added Industries

Value-added manufacturing industries require significant capital investment each year to maintain production capacity. In the mid-1990's, value-added manufacturers expanded their stock of plant and equipment, but food and tobacco manufacturers are the only value-added industries that expanded their productive capacity faster than nonvalue-added manufacturing industries.

The stock of capital per production worker in major value-added industries averaged $103,000 in 1994. This is slightly above the average for other industries, but masks the diversity in capital intensity among value-added industries. Food processing, tobacco, and paper products are among the most capital-intensive manufacturing industries. The paper industry, in particular, is highly capital intensive, averaging $199,000 per worker. Other value-added industries, including lumber and wood products, leather, and furniture manufacturers, use considerably less capital per worker.

New investment is needed each year to replace depreciated capital and to expand capacity by building new facilities, adding to existing facilities, or upgrading plant and equipment (see box "Capital Investment Is an Indicator of Growth"). Levels of new investment per worker in 1994 (the most recent year for which detailed data are available) again show the diversity among value-added industries in capital intensity. The paper products and food and tobacco industries (food and tobacco are combined as a single industry in these statistics) invested roughly $20,000 or more per production worker (fig. 1). Investment by lumber and wood products ($5,118 per worker) and leather products manufacturers ($2,286 per worker) was more modest.

Equipment accounts for much of the investment in these industries, and the type of equipment employed by value-added industries reflects the diversity of production processes among these industries. For example, 28.5 percent of equipment investment in value-added industries is for specialized industrial machinery (machinery designed explicitly for the industry that uses it, table 1). For other manufacturing, only 6 percent of new investment is in equipment specialized for their industry, and these industries have the largest share of their new equipment investment devoted to office computing equipment. About 22 percent of new investment in other manufacturing is for office computing equipment, whereas value-added industries have devoted half of this amount on such investments. This is a reflection of the workforce in value-added manufacturing, which includes a large share of less skilled production line workers, and relatively few professional and technical workers (see "Value-Added Workers Earn Less, Have Less Education Than Other Rural Manufacturing Workers"). Professional and technical workers tend to work with computers and office equipment, while production line workers tend to work with industrial machinery and equipment.

Figure 1
Annual capital expenditures per production worker by industry, 1994
Paper, food, and tobacco manufacturers have the greatest capital requirements per worker
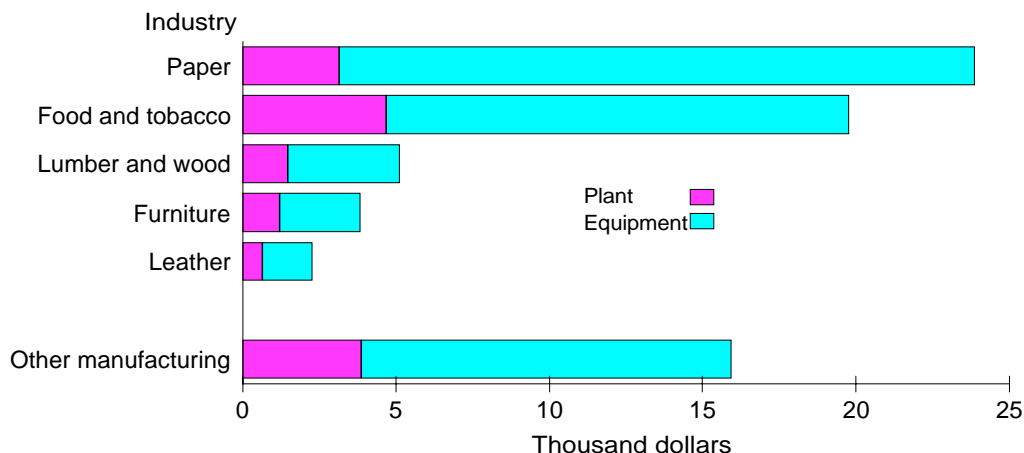
Source: ERS analysis of Bureau of Economic Analysis data.

Special industry equipment averages more than one quarter of the total capital invest-
ment in all value-added industry, with food and tobacco devoting the highest share (33.9
percent), lumber and wood the least (16.0 percent). For furniture and leather manufactur-
ing, computers were the leading type of equipment investment, whereas lumber and
wood manufacturers made no appreciable new investments in computers. Lumber and
wood product industries have their greatest investments in trucks, buses, and trailers.

Over 30 percent of new capital expenditures by furniture manufacturers were devoted to
new or improved plant facilities. A similar share of new investment was devoted to plant
facilities by lumber and wood products (14.9 percent "industrial buildings" and 13.8 per-
cent "other structures"). Paper and allied product manufacturers, who invest more heavily
in machinery and equipment, devoted a relatively small share of their new investment
(12.9 percent) to improving or expanding their plant facilities.

Capital Investment Is an Indicator of Growth

The stock of capital, or the capital inventory, indicates the current mix of labor and capital.
Industries with a high ratio of capital per worker usually must pay a large share of their rev-
enue to capital, and a relatively small share to labor (salaries and wages).

We can get an indication of whether the stock of capital is growing by looking at new invest-
ment—that is, the new plant and equipment purchased to add to the capital stock, or to
replace old, worn-out capital that must be replaced. Gross investment is measured by the
amount of capital expenditures during a particular year. Depreciation is the amount of capital
that wears out or becomes unusable, through physical deterioration or obsolescence. Gross
investment must be greater than depreciation in order for the capital stock to grow. If gross
investment is less than depreciation, the capital stock will decline. The difference between
gross investment and depreciation is net investment.

Investment capital is drawn to activities (industries) that promise high returns so they can
expand their capacity and output. Activities with less promising prospects will have difficulty
attracting new capital. Thus, industries with strong growth prospects will tend to attract large
net investment, while those with less promising prospects will have lower net investment.

Table 1

Shares of capital expenditures by asset type and industry
The largest share of value-added industry capital investment is in special industry machinery

Industry	Industrial buildings	Special industry machinery	General industry equipment	Computing equipment	Trucks, buses, trailers	Principal other asset
			Percent			
Major value-added industries	19.8	28.5	10.2	10.9	8.3	4.0[1]
Food and tobacco	23.1	33.9	5.4	10.3	7.7	5.7[2]
Lumber and wood products	14.9	16.0	*	*	20.1	13.8[3]
Furniture and fixtures	31.1	13.4	*	24.8	8.8	10.5[4]
Paper and allied products	12.9	23.1	22.1	12.0	*	10.4[5]
Leather products	26.8	20.4	13.4	27.5	2.1	2.1[4,5]
Other manufacturing	22.6	6.0	7.5	21.8	*	13.1[4]

*No appreciable new investment. [1]Fabricated metal equipment. [2]Photocopy equipment. [3]Other structures.
[4]Metal working machines. [5]Electric transmissions and industry apparatus.
Source: Bureau of Economic Analysis.

Net Investment Indicates Moderate Growth

Net investment measures the difference between total investment and the amount needed to replace worn out and obsolete capital. Positive net investment suggests that businesses are expanding capacity (building new plants, adding production lines) or upgrading existing equipment and facilities. ERS estimates show that net investment was positive in each major value-added industry in the mid-1990's. However, the rate at which value-added industries are adding to their stock of plant and equipment through new capital investment indicates that most are expanding capacity more slowly than other manufacturing industries.

Overall, annual net capital investment by value-added manufacturers in the 1990's amounted to 3.2 percent of the value of their stock of plant and equipment. This was identical to the rate for nonvalue-added manufacturers. Food and tobacco manufacturers, with a rate of 4.6 percent, are the only major value-added industry group that expanded productive capital stock at a rate faster than the 3.2-percent average (fig. 2). Lumber and wood products expanded capacity by 2.5 percent, and the furniture industry expanded by 1.9 percent annually. While the dollar value of net investment per worker by paper and allied product manufacturers exceeds that of other value-added industries, the rate of expansion in their production capacity has averaged a modest 1.6 percent annually in the mid-1990's. The slowest rate of investment among value-added industries was for the leather industry (less than 1 percent annually).

New Investment Concentrated in South and Midwest

New capital expenditures in value-added manufacturing are concentrated in the East North Central (20.5 percent of expenditures) and South Atlantic (23.1 percent) regions (fig. 3). These two regions together accounted for 43.6 percent of capital expenditures by value-added manufacturers. The Pacific region accounted for 12.5 percent of value-added capital expenditures, and the Mid-Atlantic, East South Central, West South Central, and West North Central regions each accounted for between 9 and 11 percent. Two southern regions, the South Atlantic and East South Central regions, combined accounted for nearly 33 percent of all value-added capital expenditures, but only 21 percent of capital expenditures for other types of manufacturing. This indicates the importance of value-added manufacturing in the South.

Figure 2
Net investment as a share of capital inventory: Value-added and other manufacturing industries
Only the food and tobacco industry is expanding capacity at a rate faster than nonvalue-added industry
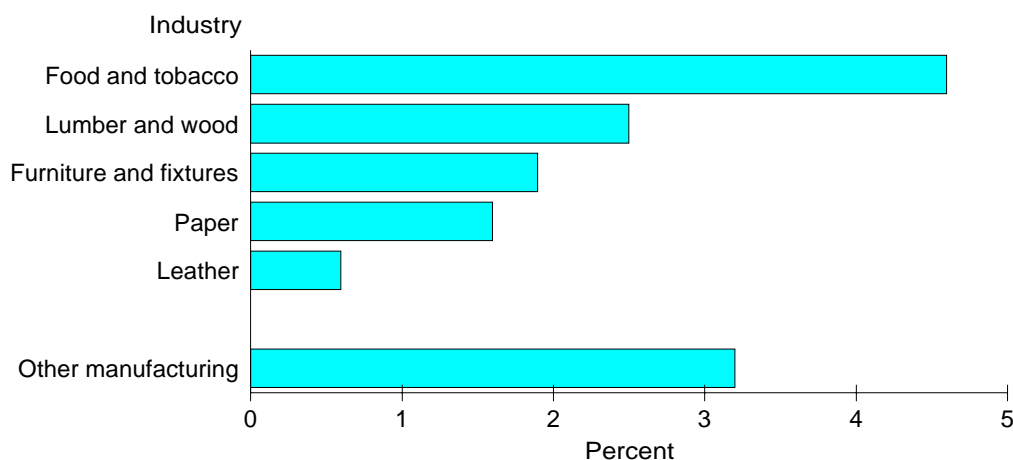
Source: ERS analysis of Bureau of Economic Analysis data.

Value-added industries consume an important share of nonmetro investment capital. The food, tobacco, lumber and wood products, paper, and leather industries accounted together for about 34 percent of capital expenditures by nonmetro manufacturing businesses in 1994. In metro areas, those industries' share of capital expenditures was only 14 percent. New investments in value-added industries are relatively concentrated in nonmetro areas. Nonmetro areas accounted for about 40 percent of capital expenditures made by value-added industries in 1994. About half of nonmetro value-added investment occurred in Southern regions.

The concentration of value-added manufacturing industry capital expenditures in nonmetro areas reflects the attraction of capital to other industries in metro areas. The largest shares of new capital expenditures in urban areas go to petroleum, electrical, and transportation equipment industries, while the paper industry has the largest share of capital expenditures in nonmetro areas. *[Patrick Canning, 202-694-5341, pcanning@econ.ag.gov]*

Figure 3
Regional shares of capital investment: Value-added and other manufacturing industries

Southern regions receive a relatively large share of value-added industry investment

New England
3.3%
5.3%

Pacific
12.5%
11.8%

Mountain
2.1%
2.9%

West
North Central
9.1%
7.3%

20.5%
25.5%

East
North Central

Middle
Atlantic
10.6%
13.8%

West
South Central
9.2%
11.8%

East
South
Central
9.6%
6.8%

23.1%
14.7%

South
Atlantic

Top Number (in bold): share of value-added industries
Bottom Number: share of other manufacturing

Source: ERS analysis of 1992 Census of Manufactures.
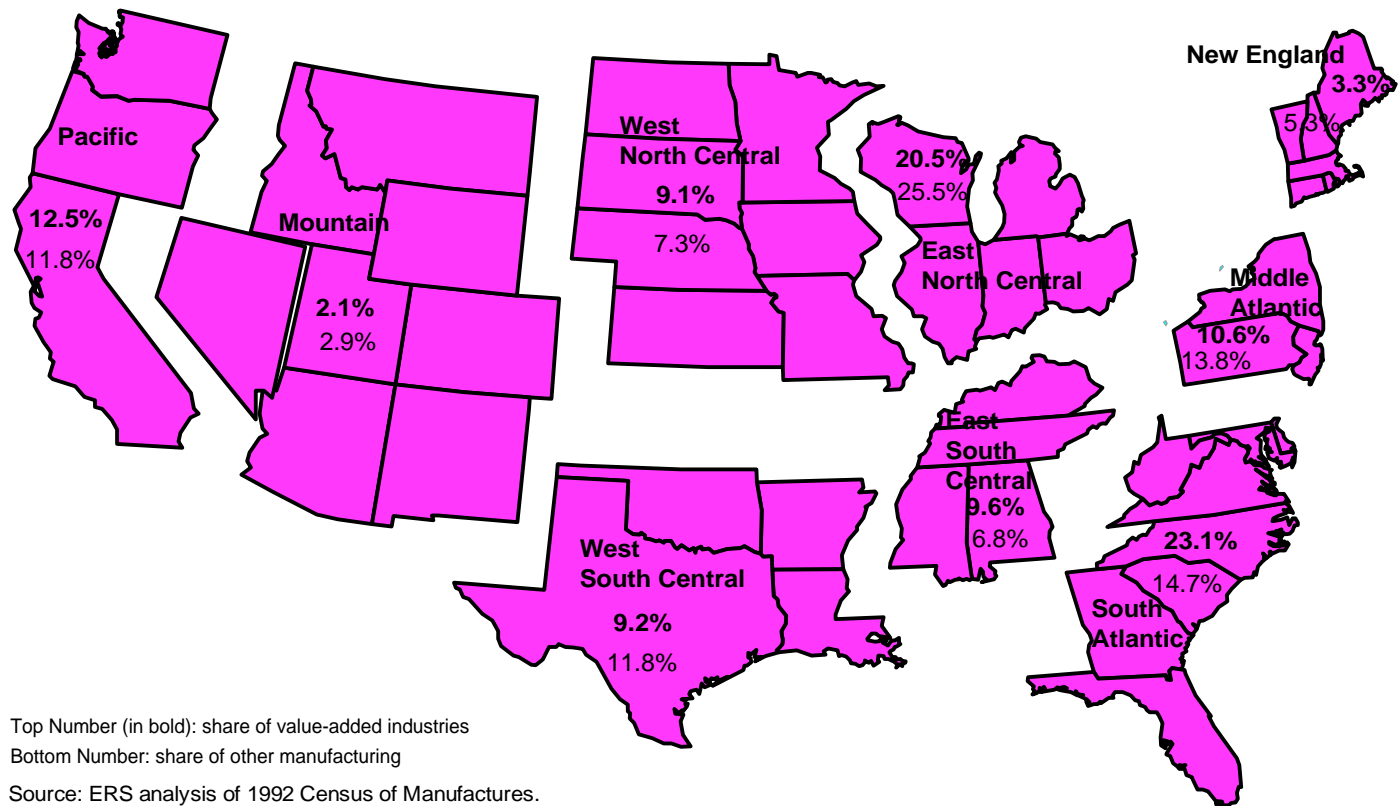
Most Value-Added Firms Have Access to Needed Capital

Expanding capacity was the most frequently cited reason for undertaking capital investments, while compliance with regulations was cited less frequently than other reasons. Only a few value-added manufacturers reported problems obtaining outside financing. Most report using internal funds and bank loans to finance capital improvements, while few report using equity capital from new, unrelated owners or venture capital firms.

Both new and existing value-added firms need capital to survive and grow. Growing firms need capital to finance new equipment and construction to accommodate expanded operations. Many value-added plants need new or updated equipment to accommodate new technologies and raise worker productivity and competitiveness. Heightened public concerns with environmental quality and food safety have placed additional pressure on value-added firms to make investments in new technologies and equipment to comply with government regulations and standards.

The ERS Rural Manufacturing Survey (see description in "Data Sources" appendix) shows that 58 percent of value-added manufacturing plants reported having planned or undertaken a major expansion or modernization during the 3 years preceding the survey. This is slightly higher than the percentage (52 percent) of other manufacturing establishments reporting an expansion or modernization. Over 80 percent of printing, dairy products, and preserved fruits and vegetables manufacturers, and over 70 percent of sawmills and manufacturers of wood buildings and mobile homes reported an expansion/modernization.

Expanding Capacity Is Most Common Reason for Capital Investment

Capital investment is needed when old equipment or facilities are worn out or damaged and need to be replaced. Investment can also expand the scale of operations or upgrade the production process with new technologies or management techniques. The Rural Manufacturing Survey asked respondents who had expanded or modernized their plant and equipment within the previous 3 years about reasons for capital investment decisions. Expanding production capacity was the most cited reason for capital investments. Nearly all respondents identified "Expand production capacity" as an important reason. Nearly 80 percent said it was "very important," and another 12 percent said it was "somewhat important" (fig. 1). These responses suggest considerable growth and optimism on the part of value-added firms.

Figure 1

Reasons for investing in capital improvements by value-added manufacturing plants

The most common reason for investing was expanding of capacity

Percent of plants

☐ Very important ☐ Somewhat important
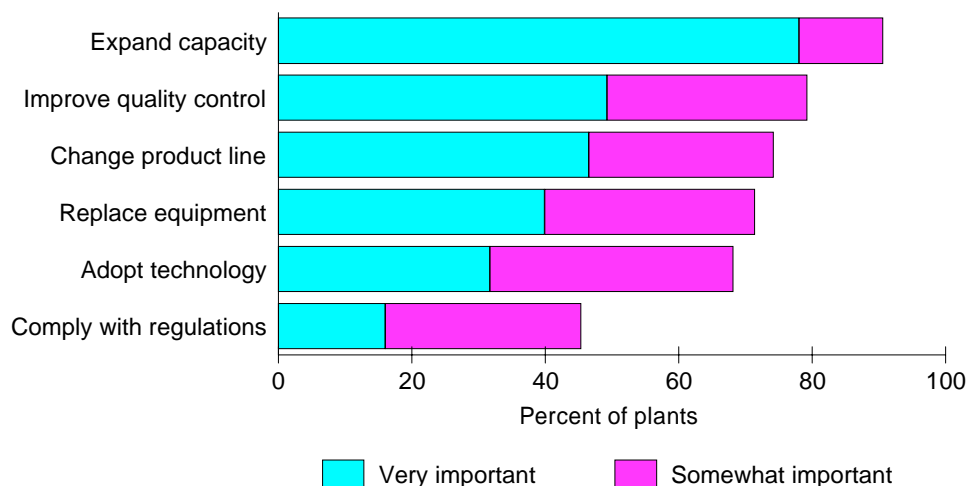
Source: ERS analysis of 1996 Rural Manufacturing Survey.

Four other reasons for investment, "improve quality control," "change or add to the product line," "replace old or damaged equipment," and "adopt new technology or management practice," were also frequently cited as "very important" or "somewhat important." Each of these reasons was cited by 70 to 80 percent of respondents as either "somewhat important" or "very important." Quality control has been an increasingly important concern for manufacturers, as product quality has become an important determinant of a company's competitiveness. Food safety concerns have also raised the importance of quality control in food processing industries. Many businesses are adopting new technologies and management practices to raise employee productivity, cut materials waste, and promote flexibility in the production process.

Among value-added industries, compliance costs associated with environmental and food safety regulations are an important issue. Sixteen percent cited "comply with new regulations" as a "very important" reason for capital investment, and 29 percent cited it as "somewhat important." The frequency with which compliance is cited as a reason for capital investment suggests that regulatory costs are significant. Still, compliance with regulations is cited less frequently than reasons (listed above) that are directly related to maintaining or increasing the competitiveness of the manufacturing business.

Most Investments Use Internally Generated Funds or Bank Loans

Most respondents to the Rural Manufacturing Survey used internal sources of financing for capital investments. About two-thirds of value-added establishments used retained earnings, and half of those that were part of a multiunit firm used funds from elsewhere in the firm. Most also used borrowed funds. Of the 58 percent of value-added establishments that used borrowed funds, 90 percent said they borrowed from a bank or savings and loan, 25 percent borrowed from individuals and families, and only a few respondents borrowed from other firms or issued bonds. About 11 percent acquired capital by issuing new equity investments. Of those, three out of four said the new capital came from existing owners, partners, or their families. One in four said capital came from new, unrelated owners, and only a few used a venture capital firm. About 1 in 10 value-added establishments reported that a government program had a role in financing their capital improvements.

Few Businesses Report Problems With Access to Capital

About 18 percent of value-added manufacturers had to curtail their plans for capital improvements due to problems encountered in carrying out their investment plans. Rural Manufacturing Survey respondents were asked to rate the importance of four potential problems that can hinder capital investment plans. Three problems, "acquiring support from headquarters," "underestimated financial costs," and "uncertain or changing product market situation," were cited with roughly equal frequency (fig. 2). About 10 percent of respondents cited each as a major problem, and about 30 percent cited each as a minor problem. A fourth problem, "difficulty in arranging outside financing," was also cited by 10 percent as a major problem, but was cited by fewer than 20 percent as a minor problem. This suggests that most existing value-added businesses are able to acquire the capital they need to expand or update their operations.

The responses by value-added businesses discussed above were very similar to those of other manufacturing businesses. The survey responses did not reveal any disadvantages or barriers to capital access specific to value-added firms. This is consistent with other recent studies that found few problems with access to capital for rural businesses. However, a weakness of this analysis is that it says little about the difficulties encountered by new firms or plants when attempting to raise capital. The Rural Manufacturing Survey includes only a very few new plants and says nothing about plants that went out of business or were unable to begin operations due to lack of capital. The survey also lacks information on very small firms (with less than 10 employees), which face the greatest problems in raising capital.

In particular, there are concerns about financing for innovative value-added activities that are unfamiliar to local bankers. New, risky businesses often rely upon venture capital firms, but small, rural businesses may not have access to this type of capital. Our survey shows that most new equity capital comes from existing owners and relatives. While these results indicate few problems with capital access, officials and economic development professionals planning a value-added development strategy should be aware of the possible capital needs of new start-ups and innovative business ventures. *[Fred Gale, 202-694-5349, fgale@econ.ag.gov]*

Figure 2
Problems encountered by value-added manufacturers when undertaking capital investment plans
Difficulty obtaining outside financing was reported less frequently than other problems
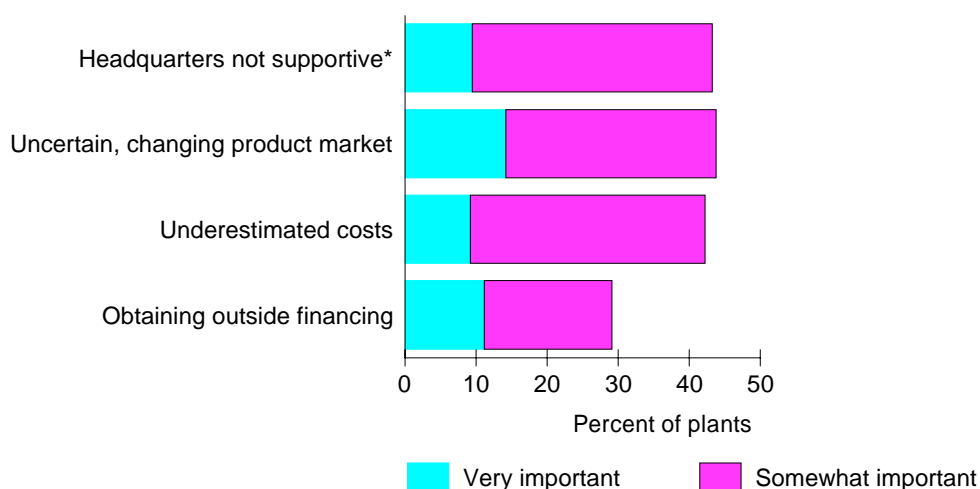
* Multiunit firms only.
Source: ERS analysis of Rural Manufacturing Survey.

Trade Agreements May Open New Markets for Value-Added Exports

Developments in world markets have important implications for value-added products. Freer trade as a result of international trade agreements has contributed to growth in processed food and forest products trade. The direct impacts of lower trade barriers on U.S. exports appear to be modest, so far, but rising incomes worldwide due to liberalized trade may have a more important impact on demand for U.S. value-added exports.

Exports are an important component of demand for value-added products. About 5 percent of U.S. processed food output is exported, and the percentage is even higher for lumber and wood products and pulp and paper (table 1). Exports of processed food and beverages exceed exports of bulk agricultural commodities by a considerable margin, and exports of processed commodities create considerably more jobs than exports of bulk commodities (see app. 5, "Economic Activity Triggered by Agricultural Trade"). Many value-added sectors are controlled by large multinational corporations, so global developments have an important effect on markets for these products (see D.R. Henderson, C.R. Handy, and S.A. Neff (eds.), *Globalization of the Processed Foods Market, Economic Research Service*, AER-742, September 1996).

Among developed countries, trade in processed agricultural and forest products has grown more rapidly than trade in basic commodities. Over the 10-year period from the early 1980's to the early 1990's, exports of processed agricultural commodities by Organization for Economic Cooperation and Development (OECD) countries grew 4.5 percent annually, while exports of basic agricultural commodities increased by only 0.1 percent per year. As a result, the share of processed commodities in OECD agricultural exports increased from 27 to 37 percent. Imports of processed products also grew rapidly. Over the same time period, OECD imports of processed agricultural commodities increased 5.4 percent annually, while imports of basic agricultural commodities increased 2.2 percent annually. Similarly, trade trends in forest products reflect an increasing importance of higher valued products to global trade.

Growth in processed commodities trade has been driven by income-related demand growth in both industrialized economies and developing countries, large and growing populations in developing countries, and changing consumption patterns facilitated by product development and technical innovation. As the standard of living has increased, the preference for processed food, convenience foods in particular, and forest commodities has increased. Technological improvements have greatly facilitated transportation and storage of agricultural products and have contributed to increased and stable supply at competitive prices. For example, improved transportation and storage have led to a rapid increase in the trade of chilled and frozen vegetable products. Similarly, changes in technology and preferences will favor growth in consumption of reconstituted products as opposed to solid products, such as sawn wood.

International Trade Agreements Reduce Trade Barriers

Freer trade resulting from various international trade agreements, including the World Trade Organization (WTO), and its predecessor, the General Agreement on Tariffs and Trade (GATT), has the potential to open new markets for U.S. products. As a result of negotiations under the Uruguay Round of GATT, nontariff trade barriers were converted to tariffs providing an equivalent degree of protection, tariffs are being cut for many commodities, and subsidies and other trade-distorting measures are being reduced or eliminated. For some commodities unilateral reforms and bilateral agreements have been even more significant than reforms required by the Uruguay Round. Reduction of trade barriers is particularly important for trade in processed commodities because many countries have higher rates of protection for processed goods than for unprocessed commodities. The Uruguay Round of GATT sought to reduce this "tariff escalation," but it is still permitted under WTO rules and still exists in many countries. Tariff escalation appears to be more prevalent and severe in developing countries than in developed nations.

Worldwide, forest products tend to be among the least protected commodities. Trade in forest products has generally benefited from successive multilateral accords under the WTO and GATT. Pre-Uruguay Round tariff rates on forest products were the lowest of all

major industrial product groups, and WTO member nations are required to reduce them even further. Additionally, the major developed countries have committed themselves to phasing out tariffs on pulp and paper products during 1995-2005, and many of these countries are also eliminating the tariffs on furniture imports. Forest products have the highest percentage of all imports (85 percent) without duty in developed country import markets. Developing country tariff rates on forest products have also been reduced, but they are still generally higher than those in developed markets. In most markets tariff escalation will be reduced or eliminated under WTO, but a high degree of tariff escalation for forest products still persists in some markets.

Trade in textiles and clothing is largely subject to bilateral quotas negotiated under the Multifibre Arrangement. The objective of the WTO is to eventually integrate the sector into the GATT. In January 1995, each WTO member nation integrated into the GATT products from the specific list in the Agreement, which accounted for not less than 16 percent of its total volume of imports in 1990. All remaining products will be integrated in stages by January 2005. U.S. textiles are believed to have a competitive advantage in access to low-cost cotton and high levels of efficiency, but the labor-intensive U.S. apparel sector, vulnerable to imports from low-wage competitors, could struggle to remain competitive in an environment of freer trade.

Tariffication of products containing sugar has been at rather high levels, reflecting tariffication levels for raw sugar, and less than average reduction commitments. Thus, trade in sugar products probably will not grow significantly.

Trade in processed fruit and vegetable products is growing rapidly. U.S. exports of fruits and nuts grew from under $3.2 billion in 1992 to over $4.1 billion in 1996. Tariff levels tend to vary according to whether they apply to competing or noncompeting products. While considerable tariff escalation is observed in fruit and vegetable products, tariffs are reduced substantially for some products. Overall, some additional growth is expected, mainly in products that had not faced high tariff barriers because they do not compete with domestically produced products.

Meat trade has grown rapidly (nearly 7 percent annually for developed countries). U.S. exports of meat products grew from about $4 billion in 1992 to over $6.5 billion in 1996 (fig. 1). Much of the growth can be attributed to trade liberalization in Japan and Korea resulting from unilateral reforms and bilateral trade negotiations with the United States. Trade in meat products was growing prior to the Uruguay Round, and ERS projects continued export growth in the future.

Figure 1
Exports of meat and paper products, 1992-96
Exports of meat and paper have grown in the 1990's
Million dollars
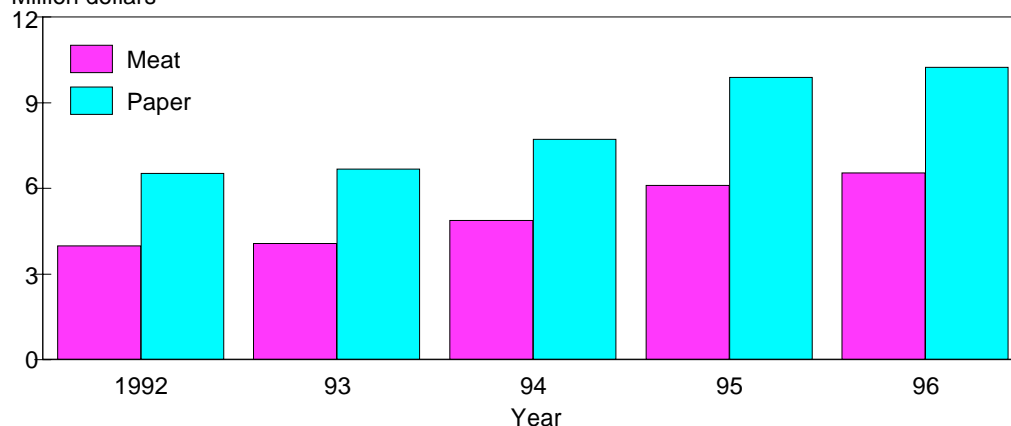
Source: U.S. Bureau of the Census.

Trade in noncheese dairy products has not increased substantially since the early 1980's and tariff reductions in processed dairy products and products containing significant dairy inputs are close to the minimal rate in most cases (an exception is the European Union, which reduced tariffs on most dairy products by 36 percent). Thus, with the exception of cheese, processed dairy products are expected to benefit less in terms of trade than other commodities. Trade in cheese, however, is likely to be affected because of export subsidy commitments, especially those made by the European Union, the world's biggest exporter of cheese. Combined with some growth in trade from the minimum access quotas, there could be significant benefits for non-European Union cheese exporters.

Other Factors May Influence Trade

An important aspect of most trade agreements for trade in processed foods was the creation of a clearer set of obligations regarding product safety standards. The Uruguay Round agreement allows countries to determine their own standards governing food safety and health, but establishes a number of obligations to discourage their use as barriers to trade. The agreement provides for standardized sanitary and phytosanitary rulemaking and established a new dispute settlement mechanism to improve enforcement. These measures potentially could open new markets for U.S. value-added exports and open the U.S. market to import competition.

Factors other than trade policies will have important effects on trade in processed products. International marketing of processed products is much more complex than is the marketing of homogeneous basic commodities. Aspects such as brand awareness and product differentiation are important. Markets for bulk commodities and logs more closely resemble the economist's perfectly competitive model than do markets for processed food. Trade in processed food is often controlled by a few large multinational companies, and trade is based less on comparative advantage and resource endowments and more on strategic considerations. Also, food and beverage companies often prefer to sell to foreign markets by establishing foreign operations (foreign direct investment) rather than exporting directly. Growing foreign markets may be supplied by newly established overseas plants owned by U.S. companies rather than by exports of U.S. products. Other factors influencing trade include transportation costs, input price and availability, quality control, customer service, and the need to tailor products to local preferences.

Studies have projected that incomes, in general, will increase worldwide as a result of WTO and GATT. Freer trade will permit resources to be put to their most efficient use, raising productivity and earnings. Costly subsidies will be reduced and prices will drop for many consumers. This may be the most important impact of the Uruguay Round Agreement. Higher incomes will increase the demand for processed products and expand worldwide markets for value-added products. *[Marinos Tsigas, 202-694-5441, mtsigas@econ.ag.gov]*

Table 1

Exports as a share of manufacturers' shipments: selected value-added industries, 1993

Exports are an important component of demand for many value-added products

Industry	SIC[1]	Export share
		Percent
Food products	20	5
Meat products	2011	7
Poultry and eggs	2015	5
Condensed and evaporated milk	2023	8
Canned specialties	2032	2
Canned fruits and vegetables	2033	6
Canned, fresh, and frozen fruits and vegetables	2037	7
Flour and grain mill products	2041	6
Cereal breakfast foods	2043	2
Wet corn milling	2046	23
Chocolate confections	2066	5
Soybean oil mill products	2075	16
Malt beverages	2082	1
Bottled and canned soft drinks	2086	1
Chips	2096	2
Cigarettes	2111	17
Cotton broadwoven fabrics	2211	9
Broadwoven wool fabrics	2231	6
Leather and sheep-lined clothing	2386	32
Lumber and wood products	24	9
Logs and pulpwood	2411	28
Sawmill and planing products	2421	14
Wood millwork products	2431	3
Hardwood veneer and plywood	2435	13
Softwood veneer and plywood	2436	7
Reconstituted wood products	2493	6
Furniture and fixtures	25	6
Paper and allied products	26	7
Pulp mill products	2611	49
Paper and paperboard products	262,263	8
Sanitary paper products	2676	4
Books	2731	10
Blankbooks, looseleaf binders	2782	7
Synthetic cellulosic fibers	2823	27
Gum and wood chemicals	2861	17
Leather	3111	28
Men's footwear	3143	7
Women's footwear	3144	5

[1]Standard Industrial Classification code.
 Source: U.S. Bureau of the Census, *U.S. Commodity Exports and Imports as Related to Output: 1993 and 1992,* OEI/93, September 1995.

Farm- and Forest-Related Value-Added Exports Boost the U.S. Economy

Value-added exports have an important impact on the U.S. economy that extends to many sectors. Exports by agricultural- and wood-based value- added industries support- ed an estimated 940,000 U.S. jobs in 1996. Each export dollar generated $1.51 in supporting activity spread across all sec- tors of the economy.

Exports are a key to competitiveness for value-added firms and they support a consid- erable amount of economic activity in the United States. In 1996, the United States exported an estimated $63.9 billion of value-added agricultural- and wood-based prod- ucts, including $21.7 billion of commodities from the food processing sector, $13.8 billion of exports from lumber and wood manufacturing sectors, $13.5 billion from paper and printing sectors, and $8.2 billion of trade and transportation services to get exported goods from the processing plant to the port (table 1). Direct value-added exports gener- ated an additional output of $96.7 billion; therefore, each dollar received from value-added farm and forest exports stimulated an additional $1.51 in supporting activities. The addi- tional business activity attributable to high value exports was distributed across all eco- nomic sectors: 22 percent to farming, 37 percent to manufacturing, 5 percent to forest and agricultural services, 25 percent to other services, and 11 percent to wholesale and retail trade, and transportation. Value-added exports generated an estimated 940,400 full- time civilian jobs, including 116,200 or 3.4 percent of all jobs in the farm sector. Processors' purchases of raw and bulk commodities, fertilizer, and other backward-linked inputs to produce exported commodities spurred economic activity in the (mostly rural) farming and forest sectors and trade and transportation sectors.

Value-Added Exports Generate New Business, Add Jobs

The $96.7 billion of supporting activities included $21.4 billion from the farm sector. Because no direct exports from the farm sectors were included in this analysis, all of the output generated in the farm sector was in support of the processed or manufactured

Table 1

Economic activity supported by value-added agricultural and wood products by industry, 1996
Over 940,000 jobs are supported directly or indirectly by value-added exports

Industry	Exports	Supporting activity	Total activity	Income	Employment
		Million dollars			Number
Farming	0	21,363	21,363	8,164	116,156
Mining	0	2,165	2,165	1,370	6,940
Forestry, fishing, agricultural services	0	5,213	5,213	1,866	50,153
Food processing	21,671	7,077	28,746	5,896	86,279
Finished textiles	311	544	855	284	6,747
Leather	692	183	875	226	4,946
Tobacco	4,992	836	5,828	3,244	7,336
Lumber and wood products	12,334	6,483	18,817	6,060	119,966
Wood furniture[1]	1,488	-24	1,464	655	17,103
Paper	11,520	4,345	15,865	6,337	57,499
Printing and wood chemicals and fibers	2,053	733	2,786	1,337	20,928
Other manufacturing	666	15,460	16,126	6,480	75,984
Transportation	2,310	4,621	6,931	3,790	68,839
Wholesale and retail trade	5,897	6,574	12,471	8,766	124,581
Food service	0	554	554	288	14,006
Other services	0	20,522	20,522	11,528	162,991
Total	63,934	96,648	160,580	66,291	940,454

[1]Negative supporting activity indicates that most wood furniture production is used as a final product and not as an intermediate input into other industries, which would stimulate added activity. Further, some demand is met by production from other industries and imports.

Source: Calculated by ERS from supporting ERS economic models using data from the Bureau of Economic Analysis, Bureau of Labor Statistics, and Bureau of the Census.

high-value exports. These exports also generated supporting activities worth $2.1 billion in the mining sector, $5.2 billion in the forest and agricultural services sectors, and $20.9 billion from the service sectors (such as credit, banking, real estate, and computers). None of these sectors contributed any direct value-added exports. Nonfarm, nonforestry sectors of the economy received about 78 percent or $134 billion of the additional economic activity.

Various factors, including export commodity mix, sectoral prices, and volume of goods, contributed to the level of estimated employment required to support 1996's value-added exports. Of the 940,400 full-time civilian jobs related to forest and agricultural value-added exports, more than 116,000 were on U.S. farms. Additionally, 824,000 jobs in the nonfarm sector were directly or indirectly related to the assembling, processing, and distributing of these products for export. About 86,000 of these were in food processing, 57,000 in forestry and mining, 7,000 in textiles, 5,000 in the leather industry, 7,000 in the tobacco manufacturing sector, 119,000 in the lumber and wood industries, 95,000 in the furniture, paper, and printing industries, 125,000 in wholesale and retail trade, 69,000 in transportation, 14,000 in food service, and 163,000 in other services.

Value-added agricultural exports accounted for $27.7 billion (43 percent of all direct exports) of which $21.7 billion was processed food. Exports of forest-based processed products were valued at $28 billion. Paper and printed products exports were worth over $12 billion, wood and wood furniture exports were $15 billion, and the gum and wood chemical sector exports were under $1 billion.

Nonfarm Sector Receives Most Income Effects

Some of the business activity stimulated by foreign trade includes inputs purchased from other sectors. Although $1 of value-added forest and agricultural exports in 1996 generated $2.51 in total (direct and supporting) economic activity, $1 represented income to wage earners, profits, and taxes. Thus, the $63.9 billion of exports in 1996 generated $160.6 billion of total economic activity but $63.9 billion of income in the form of wages, profits, and taxes.

In 1996, 88 percent of total income attributed to high-value exports was returned to the nonfarm sectors, with nonfarm, nonfood sectors of the economy receiving 79 percent. The forest and agriculture services sectors—which include forest nurseries, sap gathering, crop and animal management, and landscaping (but not logging), and which had no direct exports included in this analysis—accrued almost $2 billion of income from exports. The services, farming, and mining sectors also had no direct exports in this commodity bundle but shared large amounts of the income derived from trade. The service industries shared $11.5 billion, farming $8.2 billion, and mining $1.4 billion. The farm sector received 12 percent of the total income from agricultural exports, while the food processing sector received 9 percent, reflecting the importance of durable manufacturing and its attendant services in this export bill of goods.

This analysis does not include additional spending that may result from higher levels of income associated with agricultural trade. With this additional income earned from exports, U.S. farmers, factory workers, and households can purchase more appliances, farm equipment, building supplies, and other capital and consumer goods. More purchasing power is spread throughout the total economy. The heightened activity, trade, and transportation can boost investment in plants and equipment. Because this analysis does not consider such additional spending, our estimates of the economywide influences of high-value trade are conservative. *[William Edmondson, 202-694-5374, wedmonds@econ.ag.gov]*

Data Sources

Annual Survey of Manufactures

The U.S. Bureau of the Census conducts this survey of a sample of manufacturing establishments each year. This is the most comprehensive source of information about U.S. manufacturing shipments, cost of materials, value added, wages, employment, and capital expenditures. The most recent published data available at time of publication was from 1995. These data are available for detailed (four-digit SIC) industries, but little or no regional detail is usually available. However, ERS has obtained special tabulations of metro and nonmetro totals for years 1989 through 1994. Nonmetro manufacturing statistics are obtained from these special tabulations.

Farm and Farm-Related Employment

The enhanced County Business Patterns data are combined with farm employment data from the Bureau of Economic Analysis to estimate farm and farm-related employment. Farm and farm-related employment includes jobs not only in farm production, but also in its closely related industries—agricultural services, forestry, and fishing; agricultural inputs; and processing and marketing of agricultural goods—as well as industries peripherally related to farming—wholesale and retail trade of agricultural products and indirect agribusiness. Farm and farm-related industries are identified as industries having 50 percent or more of their national workforce employed in providing goods and services necessary to satisfy the final demand for agricultural products. An exception to this criterion is indirect agribusiness, in which percentages range between 32 and 50 percent.

Indexes of Industrial Production

The Federal Reserve Board estimates a monthly index of industrial production for manufacturing industries. The production index measures real output and is expressed as a percentage of real output in the base year, currently 1992. Indexes are constructed from a variety of source data, such as the quinquennial Censuses of Manufactures and Mineral Industries and the Annual Survey of Manufactures, prepared by the Bureau of the Census. On a monthly basis, the individual indexes of industrial production are constructed from two main types of source data: (1) output measured in physical units and (2) data on inputs to the production process, from which output is inferred. Data on physical products, such as tons of steel or barrels of oil, are obtained from private trade associations as well as from government agencies, including those listed above; data of this type are used to estimate monthly indexes where possible and appropriate. When suitable data on physical products are unavailable, estimates of output are based on either production-worker hours or electric power use by industry. Data on hours worked by production workers are collected in the monthly establishment survey conducted by the Bureau of Labor Statistics. The factors used to convert inputs into estimates of production are based on historical relationships between the inputs and the comprehensive data used to benchmark the indexes; these factors also may be influenced by technological or cyclical developments.

National Earnings and Employment Data

Analyses of earnings by value-added workers is based on data from the Current Population Survey, also conducted by the U.S. Bureau of the Census. This is a survey of households that provides detailed information on labor force, employment, unemployment, and demographic characteristics of the metro and nonmetro populations. Estimates are based on interviews of a national sample of about 47,000 households that are representative of the U.S. civilian noninstitutional population 16 years of age and older.

Nonmetro Employment and Establishments by Industry

Employees and establishments by county are based on 1989-94 County Business Patterns data released by the U.S. Bureau of the Census. The employment data released by the Census Bureau includes many suppressed values to protect confidentiality of indi-

vidual firms. We used an enhanced version of County Business Patterns data that includes imputed numbers for suppressed employment values estimated by Claritas, Inc.

The Rural Manufacturing Survey

ERS, in cooperation with Washington State University, conducted a nationwide survey of rural manufacturing businesses in 1996 to evaluate problems that affect their competitiveness. The Rural Manufacturing Survey provides extensive information on 2,844 nonmetro establishments and 1,065 metro establishments with 10 or more employees representing all manufacturing industries. The questions covered technology use, labor skills and training, locational barriers to competitiveness, and sources of financing. This report uses the Rural Manufacturing Survey data to evaluate the extent of local materials purchasing and capital investment decisions by value-added manufacturers.

Definitions

Food and Fiber System: The set of producers of goods and services required to assemble, process, and distribute raw farm products to U.S. and foreign consumers.

Input-output model: An economic model that represents the economy as a set of sales and purchases between sectors, final demands, and payments to labor, capital, profits, and indirect business taxes.

Metro areas: Metropolitan Statistical Areas (MSA's), as defined by the Office of Management and Budget, include core counties containing a city of 50,000 or more people and a total area population of at least 100,000. Additional contiguous counties are included in the MSA if they are economically and socially integrated with the core county. Metro areas are divided into central cities and areas outside central cities (suburbs). Throughout this publication, "urban" and "metro" have been used interchangeably to refer to people and places within MSA's.

Nonmetro areas: Counties outside metro area boundaries. Throughout this publication, "rural" and "nonmetro" are used interchangeably to refer to people and places outside of MSA's.

Regions:

Bureau of Economic Analysis regions
New England—Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont.
Mideast—Delaware, District of Columbia, Maryland, New Jersey, New York, and Pennsylvania.
Great Lakes—Illinois, Indiana, Michigan, Ohio, and Wisconsin.
Plains—Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, and South Dakota.
Southeast—Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Virginia, and West Virginia.
Southwest—Arizona, New Mexico, Oklahoma, and Texas.
Rocky Mountain—Colorado, Idaho, Montana, Utah, and Wyoming.
Far West—Alaska, California, Hawaii, Nevada, Oregon, and Washington.

Census regions and divisions

Northeast region:
New England—Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont.
Middle Atlantic—New Jersey, New York, and Pennsylvania.

Midwest region:
East North Central—Illinois, Indiana, Michigan, Ohio, and Wisconsin.
West North Central—Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, and South Dakota.

South region:
South Atlantic—Delaware, District of Columbia, Florida, Georgia, Maryland, North Carolina, South Carolina, Virginia, and West Virginia.
East South Central—Alabama, Kentucky, Mississippi, and Tennessee.
West South Central—Arkansas, Louisiana, Oklahoma, and Texas.

West region:
Mountain—Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, and Wyoming.
Pacific—Alaska, California, Hawaii, Oregon, and Washington.

Value-Added Manufacturing

We defined most farm- and forest-related value-added manufacturing on the basis of the proportion of intermediates (goods used in the production process, excluding labor and capital) obtained directly from farms and forestry or logging operations or indirectly from closely related operations. In most cases, an industry had to obtain at least 20 percent of

its intermediates from farm or forest inputs. The Bureau of Economic Analysis' Input-Output (I-O) Tables were used in calculating those percentages. A few additional industries were defined as value-added on the basis of their four-digit standard industrial code (SIC), which indicated that they made products from cotton, wool, leather, or wood. These industries could not be identified as value-added using the I-O table because they were combined with other four-digit industries in the I-O classification scheme. The fabric and apparel industries are probably underrepresented in our analysis because they are mostly classified by the type of product made, such as broad- or narrow- loomed fabric, men's wear, or mittens, not by the content of the product. Some of the fabric and apparel industries we excluded undoubtedly use cotton, other cellulose fiber from plants and trees, or wool to make their products, but we could not reliably identify them.

Appendix table 1—Value-added industry definition using four-digit SIC code

SIC code	Description
2011	Meat packing plants
2013	Sausages and other prepared meat products
2015	Poultry slaughtering and processing
2021	Creamery butter
2022	Natural, processed, and imitation cheese
2023	Dry, condensed, and evaporated dairy products
2024	Ice cream and frozen deserts
2026	Fluid milk
2032	Canned specialities
2033	Canned fruits, vegetables, preserves, jams, and jellies
2034	Dried and dehydrated fruits, vegetables, and soup mixes
2035	Pickled fruits and vegetables, vegetable sauces and seasonings, and salad dressings
2037	Frozen fruits, fruit juices, and vegetables
2038	Frozen specialities, not elsewhwere classified
2041	Flour and other grain mill products
2043	Cereal breakfast foods
2044	Rice milling
2045	Prepared flour mixes and doughs
2046	Wet corn milling
2047	Dog and cat food
2048	Prepared feeds and feed ingredients for animals and fowls, except dogs and cats
2051	Bread and other bakery products, except cookies and crackers
2052	Cookies and crackers
2053	Frozen bakery products, except bread
2061	Cane sugar, except refining
2062	Cane sugar, refining
2063	Beet sugar
2064	Candy and other confectionery products
2066	Chocolate and cocoa products
2067	Chewing gum
2068	Salted and roasted nuts and seeds
2074	Cottonseed oil mills
2075	Soybean oil mills
2076	Vegetable oil mills, except corn, cottonseed, and soybean
2077	Animal and marine fats and oils
2079	Shortening, table oils, margarine, and other edible fats and oils, not elsewhere classified
2082	Malt beverages
2083	Malt
2084	Wines, brandy, and brandy spirits
2085	Distilled and blended liquors
2086	Bottled and canned soft drinks and carbonated waters
2087	Flavoring extracts and flavoring syrups, not elsewhere classified

Selected industries from miscellaneous food preparations and kindred products (SIC 209)

SIC code	Description
2096	Potato chips, corn chips, and similar snacks
2098	Macaroni, spaghetti, vermicelli, and noodles
2099	Miscellaneous preparations, not elsewhere classified

—Continued

Appendix table 1—Value-added industry definition using four-digit SIC code—Continued

SIC code	Description
2111	Cigarettes
2121	Cigars
2131	Chewing and smoking tobacco and snuff
2141	Tobacco stemming and redrying

Selected industries from textile mill products (SIC 22):

SIC code	Description
2211	Broadwoven fabric mills, cotton
2231	Broadwoven fabric mills, wool (including dyeing and finishing)
2261	Finishers of broadwoven fabrics of cotton
2281	Yarn spinning mills
2282	Yarn texturizing, throwing, twisting, and winding mills

Selected industry from apparel (SIC 23):

SIC code	Description
2386	Leather and sheep-lined clothing

SIC code	Description
2411	Logging
2421	Sawmills and planing mills
2426	Hardwood dimension and flooring mills
2429	Special product sawmills, not elsewhere classified
2431	Millwork
2434	Wood kitchen cabinets
2435	Hardwood veneer and plywood
2436	Softwood veneer and plywood
2439	Structural wood members, not elsewhere classified
2441	Nailed and lock corner wood boxes and shook
2448	Wood pallets and skids
2449	Wood containers, not elsewhere classified
2451	Mobile homes
2452	Prefabricated wood buildings and components
2491	Wood preserving
2493	Reconstituted wood products
2499	Wood products, not elsewhere classified

Selected industries from furniture and fixtures (SIC 25):

SIC code	Description
2511	Wood household furniture, except upholstered
2512	Wood household furniture, upholstered
2517	Wood television, radio, phonograph, and sewing machine cabinets
2521	Wood office furniture
2541	Wood office and store fixtures, partitions, shelving, and lockers

SIC code	Description
2611	Pulp mills
2621	Paper mills
2631	Paperboard mills
2652	Setup paperboard boxes
2653	Corrugated and solid fiber boxes
2655	Fiber cans, tubes, drums, and similar products
2656	Sanitary food containers, except folding
2657	Folding paperboard boxes, including sanitary
2671	Packaging paper and plastics film, coated and laminated
2672	Coated and laminated paper, not elsewhere classified
2673	Plastics, foil, and coated paper bags
2674	Uncoated paper and multiwall bags
2675	Die-cut paper and paperboard and cardboard
2676	Sanitary paper products

—Continued

Appendix table 1—Value-added industry definition using four-digit SIC code—Continued

SIC code	Description
2677	Envelopes
2678	Stationery, tablets, and related products
2679	Converted paper and paperboard products, not elsewhere classified

Selected industries from printing, publishing, and allied industries (SIC 27):

SIC code	Description
2732	Book printing
2750	Commercial printing
2760	Manifold business forms
2782	Blankbooks, looseleaf binders and devices

Selected industries from chemicals and allied products (SIC 28):

SIC code	Description
2823	Cellulosic manmade products
2861	Gum and wood chemicals
3111	Leather tanning and finishing
3131	Boot and shoe cut stock and findings
3142	House slippers
3143	Men's footwear, except athletic
3144	Women's footwear, except athletic
3149	Footwear, except rubber, not elsewhere classified
3151	Leather gloves and mittens
3171	Women's handbags and purses
3172	Personal leather goods, except women's handbags and purses
3199	Leather goods, not elsewhere classified

Appendix table 2—Value-added industry definition using two-digit SIC code

SIC code	Description
20	Food and kindred products
21	Tobacco products
24	Lumber and wood products, except furniture
26	Paper and allied products
31	Leather and leather products

Appendix table 3—Farm-related value-added manufacturing by sector and detailed industry

Sectors and industries	Establishments[1]		Employees[1]		Counties with at least one establishment in the industry[2]	
	1994	Change, 1989-94	1994	Change, 1989-94	1994	Change, 1989-94
	Number	Percent	Number	Percent	Number	Percent
Meat products	3,136	2.9	420,218	17.0	1,324	5.9
Red meat packing	1,312	1.7	127,015	5.4	872	2.8
Sausages and other processed meat products	1,200	0	85,021	8.2	570	5.2
Poultry slaughter and processing	567	23.3	207,799	31.2	357	21.0
Dairy products	1,941	-12.1	134,702	-4.6	762	-8.1
Creamery butter	29	-38.3	1,507	-10.4	28	-39.1
Natural, processed, and imitation cheese	548	-7.6	35,780	11.7	282	-5.7
Dry, condensed, and evaporated dairy products	214	19.6	15,234	2.4	182	20.5
Ice cream and frozen deserts	443	-12.3	20,474	-4.0	254	-10.2
Fluid milk	692	-18.6	61,656	-13.3	439	-15.1
Canned, frozen, and preserved fruits and vegetables[3]	2,003	6.3	187,624	.7	703	8.3
Canned specialities	209	-.9	20,677	-8.6	151	3.4
Canned fruits, vegetables, preserves, jams, and jellies	657	8.6	47,394	-.6	363	11.0
Dried and dehydrated fruits, vegetables, and soup mixes	161	15.0	13,067	21.1	95	11.8
Pickled fruits and vegetables[4]	369	-.5	18,799	-3.2	229	6.0
Frozen fruits, fruit juices, and vegetables	253	3.3	43,073	-7.3	150	7.1
Frozen specialities, not elsewhere classified	333	16.8	44,720	14.8	191	7.3
Grain mill products	2,650	5.3	107,936	5.2	1,215	4.8
Flour and other grain mill products	364	3.1	13,456	2.0	279	-.4
Cereal breakfast foods	64	16.4	15,717	-1.6	55	34.1
Rice milling	59	0	4,164	-12.3	33	0
Prepared flour mixes and doughs	214	46.6	16,838	42.6	150	37.6
Wet corn milling	58	5.5	8,450	1.5	50	6.4
Dog and cat food	161	-10.1	14,199	3.2	137	-6.2
Prepared feeds and feed ingredients[5]	1,702	4.6	35,051	1.6	961	5.4
Bakery products	3,346	13.0	219,559	1.2	755	8.5
Bread and other bakery products	2,331	9.1	154,833	-2.2	615	5.9
Cookies and crackers	436	15.3	50,482	9.4	219	17.1
Frozen bakery products, except bread	166	19.4	12,505	17.7	120	16.5
Sugar and confectionery products	1,141	3.5	88,904	-2.7	497	5.3
Cane sugar, except refining	43	0	6,645	-16.2	23	15.0
Cane sugar refining	19	5.6	4,721	-4.8	17	0
Beet sugar	40	0	6,749	2.3	35	2.9
Candy and other confectionery products	752	18.2	47,721	6.1	371	16.7
Chocolate and cocoa products	157	-19.9	10,440	-6.0	112	-18.2
Chewing gum	11	-15.4	3,940	-31.6	10	-16.7
Salted and roasted nuts and seeds	98	10.1	8,653	-8.4	72	1.4
Fats and oils	511	-9.1	25,940	-11.1	349	-5.2
Soybean oil mills	96	-11.9	6,859	.4	85	-10.5
Vegetable oil mills, excluding corn, cottonseed, and soybean	27	12.5	763	-16.7	25	4.2
Other fats and oils, not elsewhere classified	98	4.3	7,801	-17.3	71	9.2
Cottonseed oil mills	36	-21.7	2,022	-21.9	32	-17.9
Animal and marine fats and oils	253	-12.2	8,470	-6.2	211	-8.3
Beverages	2,084	.1	139,273	-9.1	704	-4.9
Malt beverages	277	84.7	33,499	4.9	183	56.4
Malt	29	0	1,217	-13.9	23	9.5
Distilled and blended liquors	58	-7.9	6,175	-13.6	43	0
Wines, brandy, and brandy spirits	565	11.9	15,266	5.4	175	-1.1
Bottled and canned soft drinks and carbonated waters	840	-18.2	72,681	-18.4	473	-16.3
Flavoring extracts and syrups, not elsewhere classified	285	8.0	10,359	12.1	157	18.0
Selected miscellaneous food preparations	2,306	16.4	103,031	1.4	716	13.8
Potato chips, corn chips, and similar snacks	382	11.4	33,933	4.7	237	10.7
Macaroni, spaghetti, vermicelli, and noodles	199	-6.6	6,550	-2.2	108	.9
Miscellaneous preparations, not elsewhere classified	1,725	21.1	62,548	.1	610	17.3

See notes at end of table.   —Continued

Appendix table 3—Farm-related value-added manufacturing by sector and detailed industry—Continued

Sectors and industries	Establishments[1]		Employees[1]		Counties with at least one establishment in the industry[2]	
	1994	Change, 1989-94	1994	Change, 1989-94	1994	Change, 1989-94
	Number	Percent	Number	Percent	Number	Percent
Tobacco products	117	-16.4	34695	-23.9	74	-12.9
Cigarettes	16	23.1	22800	-29.1	14	40.0
Cigars	28	40.0	2570	10.8	18	28.6
Chewing and smoking tobacco and snuff	27	-6.9	3150	.8	25	-3.8
Tobacco stemming and redrying	44	-33.3	6015	-23.5	31	-26.2
Selected cotton or wool fabric or yarn manufacturing	1,310	13.2	174720	-14.1	502	18.4
Broadwoven fabric mills, cotton	354	24.6	54311	-20.3	217	21.9
Broadwoven fabric mills, wool[6]	100	-13.0	15296	9.9	70	-11.4
Finishers of broadwoven fabrics of cotton	320	56.1	19061	20.4	214	48.6
Yarn spinning mills	395	-6.2	67378	-23.6	185	-6.6
Yarn texturizing, throwing, twisting, and winding mills	141	6.8	18674	7.4	89	7.2
Leather products and leather and sheep-lined clothing[7]	1,812	-6.8	91,610	-21.7	633	5.1
Leather tanning and finishing	354	6.6	16,200	4.8	191	26.5
Boot and shoe cut stock and findings	84	-22.2	3,843	-23.0	55	-5.2
House slippers	30	-16.7	2,789	-34.7	28	-9.7
Men's footwear, except athletic	144	2.1	24,330	-20.3	98	-9.3
Women's footwear, except athletic	111	-19.0	14,786	-39.9	74	-17.8
Footwear, except rubber, not elsewhere classified	90	-17.4	6,067	-27.4	71	-9.0
Leather gloves and mittens	70	-6.7	3,053	6.2	53	-3.6
Women's handbags and purses	178	-31.8	4,479	-48.3	83	-11.7
Other personal leather goods	175	-4.4	5,340	-20.1	115	13.9
Leather goods, not elsewhere classified	403	15.5	8,446	14.6	236	9.3
Leather and sheep-lined clothing	110	-14.7	2,277	-9.5	49	-18.3

[1]Some establishments (and their employees) classified at the sector level could not be classified into the more detailed industries, so the subindustries do not always add to the total sector numbers.

[2]Some counties have more than one type of industry within a sector, so the numbers of counties in the industries often sum to much more than the total number at the sector level.

[3]Also includes canned, frozen, and preserved food specialities, such as canned spaghetti and frozen pizza.

[4]Also includes vegetable sauces, seasonings, and dressings.

[5]For animals, other than cats and dogs, and fowls.

[6]Also includes the dyeing and finishing of broadwoven wool fabrics.

[7]Leather products are classified under the two-digit standard industrial code 31—Leather and Leather Products. Leather and sheep-lined clothing is classified as industrial code 2386 under the two-digit standard industrial code 23—Apparel and Other Finished Products Made from Fabric and Similar Material.

Source: Calculated by ERS using data from 1989 and 1994 County Business Patterns files enhanced by Claritas, Inc.

Appendix table 4—Nonmetro share of farm-related value-added manufacturing by sector and industry, 1994

Sectors and industries	Establishments	Employees
	Percent	
Meat products	39.7	52.3
Red meat packing	50.0	51.9
Sausages and other processed meat products	23.0	23.0
Poultry slaughter and processing	52.2	64.6
Dairy products	33.5	27.8
Creamery butter	44.8	39.3
Natural, processed, and imitation cheese	55.5	49.1
Dry, condensed, and evaporated dairy products	22.7	27.3
Ice cream and frozen deserts	16.3	21.0
Fluid milk	25.0	15.9
Canned, frozen, and preserved fruits and vegetables[1]	25.8	32.8
Canned specialities	19.1	45.5
Canned fruits, vegetables, preserves, jams, and jellies	31.4	29.6
Dried and dehydrated fruits, vegetables, and soup mixes	28.6	31.0
Pickled fruits and vegetables[2]	20.6	21.8
Frozen fruits, fruit juices, and vegetables	36.0	45.2
Frozen specialities, not elsewhere classified	14.7	23.2
Grain mill products	46.6	34.5
Flour and other grain mill products	37.4	27.5
Cereal breakfast foods	25.0	7.8
Rice milling	47.5	60.0
Prepared flour mixes and doughs	16.8	25.4
Wet corn milling	44.8	39.5
Dog and cat food	36.0	31.0
Prepared feeds and feed ingredients[3]	54.6	50.8
Bakery products	10.2	12.8
Bread and other bakery products	9.7	10.8
Cookies and crackers	11.0	17.7
Frozen bakery products, except bread	7.8	17.2
Sugar and confectionery products	20.9	21.1
Cane sugar, except refining	53.5	42.3
Cane sugar refining	21.1	4.4
Beet sugar	60.0	57.4
Candy and other confectionery products	18.2	18.5
Chocolate and cocoa products	10.8	3.3
Chewing gum	9.1	14.1
Salted and roasted nuts and seeds	30.6	25.6
Fats and oils	36.4	33.5
Soybean oil mills	45.8	44.0
Vegetable oil mills, excluding corn, cottonseed, and soybean	22.2	38.1
Other fats and oils, not elsewhere classified	15.3	13.1
Cottonseed oil mills	47.2	39.7
Animal and marine fats and oils	41.1	42.0
Beverages	20.5	11.8
Malt beverages	21.7	5.9
Malt	37.9	43.3
Distilled and blended liquors	29.3	30.1
Wines, brandy, and brandy spirits	18.6	10.5
Bottled and canned soft drinks and carbonated waters	24.4	13.2
Flavoring extracts and syrups, not elsewhere classified	7.7	8.6
Selected miscellaneous food preparations	16.5	13.1
Potato chips, corn chips, and similar snacks	20.7	14.4
Macaroni, spaghetti, vermicelli, and noodles	10.1	9.3
Miscellaneous preparations, not elsewhere classified	16.3	12.7

See notes at end of table. —Continued

Appendix table 4—Nonmetro share of farm-related value-added manufacturing by sector and industry, 1994—Continued

Sectors and industries	Establishments	Employees
	Percent	
Tobacco products	18.8	12.8
Cigarettes	18.8	5.6
Cigars	21.4	35.1
Chewing and smoking tobacco and snuff	11.1	4.5
Tobacco stemming and redrying	22.7	35.3
Selected cotton or wool fabric or yarn manufacturing	33.3	51.9
Broadwoven fabric mills, cotton	29.1	50.7
Broadwoven fabric mills, wool[4]	37.0	75.7
Finishers of broadwoven fabrics of cotton	20.3	32.8
Yarn spinning mills	45.6	53.3
Yarn texturizing, throwing, twisting, and winding mills	36.2	50.6
Leather products and leather and sheep-lined clothing[5]	26.9	39.7
Leather tanning and finishing	31.4	35.4
Boot and shoe cut stock and findings	27.4	57.7
House slippers	33.3	40.4
Men's footwear, except athletic	34.7	42.8
Women's footwear, except athletic	29.7	53.2
Footwear, except rubber, not elsewhere classified	32.2	57.8
Leather gloves and mittens	65.7	69.9
Women's handbags and purses	14.0	16.2
Personal leather goods, except women's handbags and purses	17.7	14.3
Leather goods, not elsewhere classified	26.6	21.3
Leather and sheep-lined clothing	7.3	10.2

[1]Also includes canned, frozen, and preserved food specialities, such as canned spaghetti and frozen pizza.
[2]Also includes vegetable sauces, seasonings, and dressings.
[3]For animals, other than cats and dogs, and fowls.
[4]Also includes the dyeing and finishing of broadwoven wool fabrics.
[5]Leather products are classified under the two-digit standard industrial code 31—Leather and Leather Products. Leather and sheep-lined clothing is classified as industrial code 2386 under the two-digit standard industrial code 23—Apparel and Other Finished Products Made from Fabric and Similar Material.

Source: Calculated by ERS using data from 1989 and 1994 County Business Patterns files enhanced by Claritas, Inc.

Appendix table 5—Forest-related value-added manufacturing by sector and industry

Sectors and industries	Establishments[1]		Employees[1]		Counties with at least one establishment in the industry[2]	
	1994	Change, 1989-94	1994	Change, 1989-94	1994	Change, 1989-94
	Number	Percent	Number	Percent	Number	Percent
Lumber and wood products, except furniture	37,389	13.3	694,473	-2.7	2,577	3.6
Logging	13,962	17.2	84,634	-2.1	1,719	8.9
Sawmills and planing mills	5,744	5.9	145,178	-3.2	1,756	3.6
Hardwood dimension and flooring mills	808	16.4	31,079	3.7	423	11.0
Special product sawmills, not elsewhere classified	177	-14.1	1,734	-30.2	96	-4.0
Millwork	3,286	24.7	89,019	-4.6	1,011	18.1
Wood kitchen cabinets	4,475	41.3	66,181	.5	1,147	28.0
Hardwood veneer and plywood	312	3.7	21,001	-2.6	209	6.6
Softwood veneer and plywood	186	-13.9	30,237	-11.6	128	-4.5
Structural wood members, not elsewhere classified	940	17.5	28,753	18.9	612	19.8
Nailed and lock corner wood boxes and shook	299	5.7	5,163	-11.1	200	.0
Wood pallets and skids	2,009	22.9	31,944	10.1	1,028	11.3
Wood containers, not elsewhere classified	234	20.6	4,945	-12.5	185	18.6
Mobile homes	300	-12.0	46,164	13.1	165	-12.2
Prefabricated wood buildings and components	632	-2.0	18,970	-19.1	434	-1.4
Wood preserving	474	-6.1	11,259	-11.7	375	-5.3
Reconstituted wood products	300	11.9	24,081	11.0	230	10.6
Wood products, not elsewhere classified	2,758	4.0	52,775	-11.6	1,117	5.8
Paper and allied products	6,467	2.8	622,410	-1.5	1,146	3.2
Pulp mills	52	13.0	13,737	-4.2	45	7.1
Paper mills	316	.0	123,333	-7.2	204	2.5
Paperboard mills	218	-1.4	52,483	2.2	173	1.8
Setup paperboard boxes	153	-16.4	6,109	-23.4	99	-13.9
Corrugated and solid fiber boxes	1,617	1.4	114,450	3.8	571	4.4
Fiber cans, tubes, drums, and similar products	301	6.0	12,814	-1.3	204	7.4
Sanitary food containers, except folding	89	4.7	15,417	3.2	76	4.1
Folding paperboard boxes, including sanitary	580	.5	52,378	.8	265	6.0
Packaging paper and plastics film, coated and laminated	211	50.7	17,685	8.6	143	49.0
Coated and laminated paper, not elsewhere classified	458	11.2	32,909	2.1	236	17.4
Plastics, foil, and coated paper bags	516	10.5	39,730	2.4	251	10.6
Uncoated paper and multiwall bags	144	5.9	18,494	.1	116	11.5
Die-cut paper and paperboard and cardboard	394	5.9	16,877	-.7	187	-5.6
Sanitary paper products	155	15.7	39,655	1.9	113	18.9
Envelopes	266	-4.7	24,034	-14.7	133	4.7
Stationery, tablets, and related products	163	-7.9	9,232	-21.0	105	-7.9
Converted paper and paperboard products, not elsewhere classified	732	5.6	32,092	4.4	372	9.1
Selected wood furniture manufacturing	6,502	8.3	277,008	-5.1	1,262	8.2
Wood household furniture, except upholstered	2,770	7.2	125,879	-5.8	902	5.9
Wood household furniture, upholstered	1,151	10.6	83,232	2.4	342	2.4
Wood television, radio, phonograph, and sewing machine cabinets	105	41.9	4,440	-12.8	84	42.4
Wood office furniture	599	-5.8	23,620	-24.6	291	7.8
Wood office and store fixtures, partitions, shelving, and lockers	1,877	12.3	39,837	-1.7	630	23.0

See notes at end of table. —Continued

Appendix table 5—Forest-related value-added manufacturing by sector and industry—Continued

Sectors and industries	Establishments[1]		Employees[1]		Counties with at least one establishment in the industry[2]	
	1994	Change, 1989-94	1994	Change, 1989-94	1994	Change, 1989-94
	Number	Percent	Number	Percent	Number	Percent
Selected printing, publishing, and allied industries	37,919	10.0	698,895	-1.6	2,205	4.9
Book printing	615	21.3	48,218	3.5	310	21.6
Commercial printing	35,924	10.1	568,356	-.4	2,171	4.6
Manifold business forms	855	3.3	45,642	-13.5	396	2.9
Blankbooks, looseleaf binders and devices	525	8.5	36,679	-9.4	210	6.1
Selected chemicals and allied products	92	9.5	9,356	-29.1	72	1.4
Cellulosic manmade products	13	44.4	6,458	-38.1	11	37.5
Gum and wood chemicals	79	5.3	2,898	4.5	64	.0

[1]Some establishments (and their employees) classified at the sector level could not be classified into the more detailed industries, so the industries do not add to the total sector numbers.

[2]Some counties have more than one type of detailed industry within a sector, so the numbers of counties in the industries often sum to much more than the total number at the sector level.

Source: Calculated by ERS using data from 1989 and 1994 County Business Patterns files enhanced by Claritas, Inc.

Appendix table 6—Nonmetro share of forest-related value-added manufacturing by sector and industry, 1994

Sectors and industries	Establishments	Employees
	Percent	
Lumber and wood products, except furniture	55.5	55.7
Logging	78.5	80.3
Sawmills and planing mills	69.6	73.6
Hardwood dimension and flooring mills	47.6	60.1
Special product sawmills, not elsewhere classified	80.2	73.1
Millwork	22.9	40.2
Wood kitchen cabinets	19.7	24.5
Hardwood veneer and plywood	37.8	50.2
Softwood veneer and plywood	59.7	75.3
Structural wood members, not elsewhere classified	36.1	29.2
Nailed and lock corner wood boxes and shook	19.4	24.1
Wood pallets and skids	44.7	44.9
Wood containers, not elsewhere classified	32.1	58.2
Mobile homes	49.7	54.9
Prefabricated wood buildings and components	42.4	45.2
Wood preserving	48.7	49.7
Reconstituted wood products	44.0	64.1
Wood products, not elsewhere classified	36.5	47.0
Paper and allied products	16.3	27.8
Pulp mills	55.8	80.7
Paper mills	35.1	48.6
Paperboard mills	31.2	46.4
Setup paperboard boxes	14.4	16.8
Corrugated and solid fiber boxes	14.9	14.9
Fiber cans, tubes, drums, and similar products	18.9	23.0
Sanitary food containers, except folding	13.5	19.9
Folding paperboard boxes, including sanitary	10.7	13.8
Packaging paper and plastics film, coated and laminated	16.1	13.3
Coated and laminated paper, not elsewhere classified	8.7	17.2
Plastics, foil, and coated paper bags	13.2	18.7
Uncoated paper and multiwall bags	25.0	28.2
Die-cut paper and paperboard and cardboard	12.9	19.9
Sanitary paper products	26.5	27.4
Envelopes	7.9	10.3
Stationery, tablets, and related products	14.7	17.8
Converted paper and paperboard products, not elsewhere classified	16.1	22.9
Selected wood furniture manufacturing	22.3	38.0
Wood household furniture, except upholstered	28.4	39.3
Wood household furniture, upholstered	27.0	47.6
Wood television, radio, phonograph, and sewing machine cabinets	20.0	56.1
Wood office furniture	17.2	32.1
Wood office and store fixtures, partitions, shelving, and lockers	12.1	15.3
Selected printing, publishing, and allied industries	12.3	14.8
Book printing	13.0	25.4
Commercial printing	12.2	13.5
Manifold business forms	16.8	25.5
Blankbooks, looseleaf binders and devices	9.3	8.4
Selected chemicals and allied products	53.3	45.1
Cellulosic manmade products	30.8	41.0
Gum and wood chemicals	57.0	54.2

Source: Calculated by ERS using data from the 1994 County Business Patterns file enhanced by Claritas, Inc.

Latest Trends in Nonfarm Jobs and Earnings

In the 1996 Rural Industry issue of *RCaT*, we reported changes in nonfarm jobs and earnings during 1992-93. And, in the 1996 Socioeconomic Conditions issue of *RCaT*, we reported changes in earnings during 1993-94. With the release of 1995 data by the Bureau of Economic Analysis in September 1997, we now can publish the following estimates of changes in nonfarm jobs and earnings during 1994-95.

Jobs

The 1995 estimates show nonfarm jobs increasing at about the same rate in both non-metro and metro areas, 2.3 and 2.2 percent (app. table 7). That is about the same rate of job growth that nonmetro areas have averaged since the 1990-91 recession ended, 2.2 percent. Metro job growth picked up in 1995 compared with its annual average growth of 1.7 percent during 1991-95.

During 1994-95, agricultural services, construction, wholesale and retail trade, and services added jobs at a faster than average rate in both nonmetro and metro areas. Manufacturing, retail trade, and both State and local governments added jobs at slightly faster rates in nonmetro than in metro areas.

By region, job growth in New England and the Mideast continues to lag growth in the other regions, in both nonmetro and metro areas. The Rocky Mountain region continues to lead all other regions in both areas.

Earnings per Nonfarm Job

Real earnings per nonfarm job increased during 1994-95, 0.8 percent in nonmetro areas and 1.4 percent in metro areas (app. table 8). The nonmetro increase was about the same as annual average nonmetro earnings growth since the last recession, but the metro increase in earnings per nonfarm job picked up in 1995 along with metro job growth.

Nonmetro construction jobs averaged lower real earnings in 1995 than in 1994, while all other nonmetro industries averaged higher earnings in 1995. The fastest earning growth was in finance, insurance, and real estate followed by Federal military jobs. The large drop in Federal military jobs must have been more concentrated among lower ranking personnel, raising the average earnings of the remaining personnel.

Real nonfarm earnings per job increased in both nonmetro and metro areas in all BEA regions. In all regions, metro earnings growth exceeded nonmetro growth. Among non-metro regions, earnings growth was fastest in the Plains and Southeast. Among metro regions, earnings growth was fastest in the Rocky Mountain and New England regions.

Trends in Earnings per Nonfarm Job, 1969-95

When BEA releases a new year of data, it also revises the previous 2 years' estimates. The 1993 and 1994 earnings shown in appendix table 9 do not match those published in earlier issues of RCAT because of the BEA revisions and because we have now converted those years' earnings to 1995 dollars.

As the earnings ratios shown in appendix table 3 indicate, nonmetro earnings have not kept pace with metro earnings since 1979. Nonmetro earnings did narrow the gap slightly during 1993 and 1994, but again, in 1995 metro earnings grew faster than nonmetro earnings. The gap (in 1995 dollars) between metro and nonmetro earnings was at its widest in 1992, $8,553, fell to $8,109 by 1994, but rose to $8,364 by 1995. *[Linda M. Ghelfi, 202-694-5351, lghelfi@econ.ag.gov]*

Appendix table 7—Nonfarm jobs by industry and BEA region, 1995

Item	Nonmetro	Metro	Change from previous year, 1994-95		Annual average change since recession, 1991-95	
			Nonmetro	Metro	Nonmetro	Metro
	———Thousands———		————————Percent————————			
Nonfarm	24,669	121,638	2.3	2.2	2.2	1.7
Agricultural services, forestry, fisheries, other[1]	469	1,353	4.6	4.9	4.5	4.9
Mining	376	546	-1.6	-2.0	-2.7	-2.5
Construction	1,422	6,228	2.9	3.4	4.0	2.7
Manufacturing	4,439	14,787	1.5	.9	1.9	-.2
Transportation and public utilities	1,066	6,014	1.7	2.2	1.6	1.9
Wholesale trade	850	6,104	3.0	3.8	1.6	1.2
Retail trade	4,526	20,655	3.7	3.2	3.3	2.6
Finance, insurance, and real estate	1,206	9,883	-.7	-1.6	.7	0
Services	6,017	38,757	3.5	3.7	2.8	3.2
Government and government enterprises[2]	4,298	17,312	.5	-.2	1.0	.3
Federal civilian	373	2,603	-.8	-1.7	-1.2	-1.4
Federal military	389	1,845	-7.6	-7.2	-4.4	-4.4
State and local	3,536	12,864	1.6	1.2	2.0	1.4
State	981	3,768	1.8	1.2	1.7	1.5
Local	2,556	9,095	1.6	1.3	2.0	1.3
Nonfarm jobs by BEA region:						
New England	1,113	6,900	1.9	1.9	1.6	1.4
Mideast	1,748	22,704	1.2	.8	.9	.6
Great Lakes	4,209	20,280	2.5	2.5	2.4	2.0
Plains	3,800	7,240	2.2	2.4	2.1	2.3
Southeast	8,238	26,408	2.2	2.7	2.4	2.7
Southwest	2,277	12,831	2.6	3.3	1.9	2.9
Rocky Mountain	1,468	3,463	3.1	3.5	3.6	3.7
Far West	1,815	21,811	2.3	2.0	1.9	.6

[1]Other are employees of foreign embassies working in the United States.

[2]Government enterprises are government agencies that cover a substantial portion of their operating costs by selling goods and services to the public and that maintain their own separate accounts—for example, the Postal Service.

Source: Calculated by ERS using data from the Bureau of Economic Analysis.

Appendix table 8—Earnings per nonfarm job by industry and BEA region, 1995

	Nonmetro	Metro	Change from previous year, 1994-95		Average annual change since the recession, 1991-95	
			Nonmetro	Metro	Nonmetro	Metro
	——Dollars——		————————Percent————————			
Earnings per nonfarm job	22,314	30,678	0.8	1.4	0.9	0.9
By industry:						
Agricultural services, forestry, fisheries, other[1]	14,455	16,305	.6	-.4	-1.3	-2.0
Mining	37,222	43,230	1.3	3.2	.5	1.2
Construction	24,071	32,290	-2.7	-1.6	-.1	-.5
Manufacturing	30,555	44,705	.5	1.5	1.3	1.5
Transportation and public utilities	34,878	43,308	2.3	.9	1.3	1.0
Wholesale trade	27,205	41,098	1.5	1.5	1.4	1.1
Retail trade	13,382	16,431	.3	.4	-.1	-.2
Finance, insurance, and real estate	15,691	30,923	3.9	5.6	4.7	5.0
Services	18,653	28,414	2.4	2.2	2.0	.9
Government and government enterprises[2]	25,077	32,711	1.1	1.1	.6	.9
Federal civilian	38,581	45,453	.3	.4	1.8	2.0
Federal military	16,764	21,982	3.5	5.0	1.1	1.3
State and local	24,568	31,671	.9	.8	.3	.4
State	27,327	31,748	.3	.8	-.3	-.0
Local	23,509	31,639	1.1	.8	.6	.5
By BEA region:						
New England	23,475	32,862	.4	1.9	.1	.7
Mideast	23,726	34,949	.3	1.5	.4	1.0
Great Lakes	23,306	31,124	.4	1.2	1.3	1.4
Plains	20,625	28,522	1.4	1.7	1.2	1.0
Southeast	22,181	27,310	1.1	1.6	1.1	1.0
Southwest	21,022	28,800	.9	1.7	.6	.9
Rocky Mountain	21,432	27,056	.7	2.2	.9	1.4
Far West	24,410	31,600	.5	1.3	.6	.8

[1]Other are employees of foreign embassies working in the United States.
[2]Government enterprises are government agencies that cover a substantial portion of their operating costs by selling goods and services to the public and that maintain their own separate accounts—for example, the Postal Service.
Source: Calculated by ERS using data from the Bureau of Economic Analysis.

Appendix table 9—Real earnings per nonfarm job, 1969-77

Item	1969	1970	1971	1972	1973	1974	1975	1976	1977
					1995 dollars				
United States	26,274	26,603	27,054	27,856	28,003	27,271	27,167	27,955	28,151
Nonmetro	20,874	21,173	21,593	22,264	22,590	22,248	22,421	23,337	23,363
Metro	27,413	27,750	28,221	29,059	29,162	28,347	28,189	28,964	29,197
Earnings gap[1]	6,539	6,576	6,628	6,795	6,573	6,099	5,768	5,627	5,833
					Percent				
Earnings ratio[2]	76.1	76.3	76.5	76.6	77.5	78.5	79.5	80.6	80.0
Change from previous year:									
Nonmetro	NA	1.4	2.0	3.1	1.5	-1.5	.8	4.1	.1
Metro	NA	1.2	1.7	3.0	0.4	-2.8	-.6	2.7	.8

	1978	1979	1980	1981	1982	1983	1984	1985	1986
					1995 dollars				
United States	28,418	28,200	27,516	27,301	27,157	27,373	27,939	28,155	28,376
Nonmetro	23,713	23,594	22,896	22,583	22,194	22,253	22,727	22,680	22,567
Metro	29,438	29,189	28,496	28,296	28,197	28,439	29,009	29,258	29,528
Earnings gap[1]	5,725	5,595	5,600	5,713	6,003	6,186	6,282	6,579	6,962
					Percent				
Earnings ratio[2]	80.6	80.8	80.3	79.8	78.7	78.2	78.3	77.5	76.4
Change from previous year:									
Nonmetro	1.5	-0.5	-3.0	-1.4	-1.7	.3	2.1	-.2	-.5
Metro	.8	-.8	-2.4	-.7	-.4	.9	2.0	.9	.9

	1987	1988	1989	1990	1991	1992	1993	1994	1995
					1995 dollars				
United States	28,616	28,948	28,520	28,433	28,216	28,970	28,850	28,875	29,268
Nonmetro	22,344	22,415	22,043	21,712	21,512	21,854	21,810	22,133	22,314
Metro	29,855	30,229	29,791	29,759	29,552	30,407	30,283	30,242	30,678
Earnings gap[1]	7,511	7,814	7,748	8,047	8,040	8,553	8,473	8,109	8,364
					Percent				
Earnings ratio[2]	74.8	74.2	74.0	73.0	72.8	71.9	72.0	73.2	72.7
Change from previous year:									
Nonmetro	-1.0	.3	-1.7	-1.5	-.9	1.6	-.2	1.5	.8
Metro	1.1	1.3	-1.4	-.1	-.7	2.9	-.4	-.1	1.4

NA = Not applicable. No previous year in the data set from which to compute change.
[1]Earnings gap is the number of dollars by which metro earnings per nonfarm job exceed nonmetro earnings per nonfarm job.
[2]Earnings ratio is the percentage nonmetro earnings per nonfarm job are of metro earnings per nonfarm job.
Source: Calculated by ERS using data from the Bureau of Economic Analysis.

Two Methods of Measuring Farm-Linked Employment

The Economic Research Service uses two methods to measure economywide employment related to agriculture. Both methods are widely respected, and, while they provide different employment totals, both point to the continued importance of farm-related jobs in an era when direct farm employment has declined to modest levels. Both methods also recognize the wide-ranging influence of farm-related activity in the U.S. economy beyond the farm gate.

Farm and farm-related (FFR) employment estimates are produced by adding up the number of jobs in industries that have been identified as related to farming. ERS analysts identified FFR industries by choosing those where 50 percent or more of the work force is employed in providing goods and services necessary to satisfy the final demand for agricultural products. The number of full- and part-time jobs in these sectors reported in U.S. Bureau of the Census's County Business Patterns is summed to obtain an estimate of FFR employment. Since the County Business Patterns data are published for counties, FFR employment can be reported for States, regions, or other geographical units.

Food and Fiber System (FFS) employment estimates are developed using a national input-output model that describes input use and factor payments for each sector of the economy. The model is used to estimate the amount of employment in each sector needed to support the final demands for agricultural products. Thus, this measure may include jobs in all sectors of the economy, even those where the link to agriculture is weak. However, unlike the FFR measure, the FFS estimates do not count all jobs in a particular sector; only the jobs needed to support demand for agricultural products are counted.

The two methods each have strengths and weaknesses. The FFS estimates are based on a method that explicitly models the interrelationships between various sectors of the economy. The FFS estimates have a close relationship to the U.S. Department of Commerce's National Income and Product Accounts. However, the estimates are not available below the State level. The FFR estimates have the advantage of rich geographic detail that can provide valuable information about the importance of agriculture in various counties or multicounty regions.

Appendix table 10—Share of total State employment by farm and farm-related industry, 1994

State	Total farm and farm-related industries	Total farm and farm-related industries	Farm production, agricultural services, forestry, and fishing	Agricultural inputs	Agricultural processing and marketing	Agricultural wholesale and retail trade	Indirect agribusiness
	Jobs			—Percentage of total employment—			
United States	21,958,262	15.3	2.4	0.3	2.2	10.0	0.4
Alabama	410,429	18.6	3.0	.4	5.3	9.5	.5
Alaska	53,886	15.1	3.7	.1	2.3	9.0	—
Arizona	281,893	13.5	1.3	.1	.6	11.4	.1
Arkansas	270,545	20.8	5.0	.6	5.5	8.8	.9
California	2,326,836	14.2	2.0	.2	2.0	9.8	.3
Colorado	333,023	14.4	1.9	.2	1.4	10.7	.1
Connecticut	215,827	11.0	.7	.1	.8	9.1	.3
Delaware	57,845	13.6	1.2	.2	2.3	9.7	.3
Florida	1,110,856	15.5	1.9	.2	1.1	12.0	.2
Georgia	702,657	17.6	1.9	.3	4.4	10.3	.7
Hawaii	112,135	15.4	1.9	.1	1.5	11.9	—
Idaho	133,633	21.3	6.3	1.0	3.2	10.3	.4
Illinois	930,675	14.0	1.8	.6	1.7	9.4	.5
Indiana	498,024	15.4	2.7	.4	1.5	10.3	.5
Iowa	402,031	23.4	7.6	1.7	3.9	9.8	.5
Kansas	296,598	18.9	5.4	.9	2.7	9.6	.4
Kentucky	403,992	20.3	5.9	.3	3.2	10.3	.5
Louisiana	328,002	15.3	2.3	.4	1.7	10.4	.5
Maine	113,599	16.9	2.7	.1	3.3	10.5	.4
Maryland	335,801	12.5	1.1	.1	1.1	10.0	.2
Massachusetts	453,776	12.3	.5	.1	1.4	9.9	.4
Michigan	677,606	13.7	1.8	.1	1.0	10.5	.3
Minnesota	473,349	16.3	4.0	.6	1.9	9.4	.4
Mississippi	248,545	19.1	4.2	.5	4.8	9.0	.5
Missouri	526,621	17.1	4.2	.5	2.4	9.5	.4
Montana	90,470	19.6	6.4	.6	.9	11.5	.2
Nebraska	233,972	22.5	6.8	1.6	4.0	9.9	.2
Nevada	88,386	10.4	.8	.1	.4	9.0	.1
New Hampshire	89,719	13.7	.9	.1	1.3	11.0	.4
New Jersey	521,818	11.9	.5	.1	1.6	9.2	.5
New Mexico	126,483	15.0	2.8	.2	.8	11.0	.3
New York	1,161,883	12.1	.9	.1	1.7	9.2	.3
North Carolina	841,550	20.2	2.4	.3	7.3	9.6	.6
North Dakota	94,595	24.0	10.2	1.7	2.1	10.0	—
Ohio	851,218	14.0	1.8	.2	1.1	10.3	.5
Oklahoma	298,834	17.2	5.1	.4	1.6	9.9	.2
Oregon	301,306	17.1	4.4	.3	1.6	10.4	.3
Pennsylvania	925,222	14.5	1.4	.2	2.6	10.0	.4
Rhode Island	69,361	13.1	.5	.1	1.9	10.1	.6
South Carolina	376,421	19.0	1.9	.2	5.8	10.5	.7

See notes at end of table. —Continued

Appendix table 10—Share of total State employment by farm and farm-related industry, 1994—Continued

State	Total farm and farm-related industries	Total farm and farm-related industries	Farm production, agricultural services, forestry, and fishing	Agricultural inputs	Agricultural processing and marketing	Agricultural wholesale and retail trade	Indirect agribusiness
	Jobs			Percentage of total employment			
South Dakota	104,479	23.6	9.3	1.1	2.8	10.2	.3
Tennessee	539,014	18.1	3.5	.3	3.9	9.9	.6
Texas	1,543,581	15.4	2.9	.3	1.7	10.3	.3
Utah	148,820	13.9	1.9	.2	1.6	10.0	.3
Vermont	59,050	16.7	3.2	.3	1.7	11.4	.3
Virginia	555,594	14.8	1.9	.2	2.8	9.4	.4
Washington	490,857	16.4	3.5	.3	1.6	10.7	.3
West Virginia	117,335	14.7	3.0	.2	1.3	9.9	.2
Wisconsin	540,366	18.1	4.0	.7	2.5	10.2	.8
Wyoming	48,959	16.9	4.6	.4	.5	10.3	1.0

— = Less than 0.1 percent
Source: Calculated by ERS using Department of Commerce data.

Appendix table 11—Share of total nonmetro employment by farm and farm-related industry, 1994

State	Total farm and farm-related industries	Total farm and farm-related industries	Farm production, agricultural services, forestry, and fishing	Agricultural inputs	Agricultural processing and marketing	Agricultural wholesale and retail trade	Indirect agribusiness
	Jobs	──────────────────────Percentage of total employment──────────────────					
United States	6,024,299	23.9	7.9	0.8	4.6	10.1	0.5
Alabama	179,820	29.8	6.4	.9	12.7	9.0	.9
Alaska	35,527	19.6	6.6	.2	4.1	8.7	—
Arizona	41,560	17.2	2.3	.2	.4	14.2	.1
Arkansas	160,074	25.8	8.0	1.0	7.4	8.8	.6
California	94,911	22.5	8.2	.6	1.6	11.9	.2
Colorado	89,703	22.4	6.8	.6	1.9	13.1	.1
Connecticut	19,195	15.0	1.7	.2	2.4	10.1	.6
Delaware	17,090	27.4	3.8	.7	10.2	12.8	—
Florida	90,062	24.0	8.0	.7	2.0	12.9	.4
Georgia	280,554	26.0	5.1	.7	9.9	9.5	.9
Hawaii	39,337	22.8	6.0	.2	2.6	14.2	—
Idaho	98,714	24.6	8.6	1.3	3.6	10.6	.5
Illinois	201,054	22.5	8.2	1.4	2.6	9.7	.6
Indiana	162,067	19.9	6.3	.8	2.4	9.6	.9
Iowa	258,951	29.3	12.6	2.2	4.6	9.2	.5
Kansas	176,854	26.6	10.9	1.5	4.6	9.3	.3
Kentucky	224,602	25.7	10.3	.5	4.8	9.6	.4
Louisiana	85,523	21.1	7.0	1.0	3.5	8.8	.8
Maine	63,701	17.7	3.8	.2	3.0	10.3	.4
Maryland	37,923	20.8	4.4	.4	3.6	12.0	.4
Massachusetts	7,140	15.4	2.6	.1	1.4	10.9	.4
Michigan	137,445	19.3	5.4	.3	1.1	11.9	.5
Minnesota	208,125	27.0	11.0	1.5	4.1	10.0	.5
Mississippi	187,220	22.6	5.9	.7	6.6	8.8	.6
Missouri	224,059	27.0	11.8	1.0	4.6	9.3	.3
Montana	71,257	20.8	8.0	.5	.8	11.2	.3
Nebraska	149,689	32.6	14.1	2.8	5.6	10.0	.1
Nevada	14,550	12.5	3.4	.3	.2	8.5	.1
New Hampshire	35,784	14.1	1.4	.1	1.4	10.8	.4
New Jersey	NA						
New Mexico	56,524	18.5	5.6	.3	.9	11.2	.5
New York	116,693	17.2	4.2	.4	1.7	10.6	.4
North Carolina	323,500	28.1	5.0	.6	12.2	9.7	.7
North Dakota	63,528	31.0	17.1	2.0	2.6	9.2	—
Ohio	193,790	20.0	5.9	.7	2.5	10.1	.9
Oklahoma	148,879	25.1	11.7	.7	3.1	9.5	.2
Oregon	103,897	22.5	8.0	.6	2.1	11.4	.4
Pennsylvania	156,745	19.7	3.9	.4	4.3	10.9	.4
Rhode Island	5,852	13.7	1.1	—	.3	12.1	—

See notes at end of table.   —Continued

Appendix table 11—Share of total nonmetro employment by farm and farm-related industry, 1994—Continued

State	Total farm and farm-related industries	Total farm and farm-related industries	Farm production, agricultural services, forestry, and fishing	Agricultural inputs	Agricultural processing and marketing	Agricultural wholesale and retail trade	Indirect agribusiness
	Jobs	—————————————Percentage of total employment—————————————					
South Carolina	126,894	26.2	3.8	.3	10.9	10.3	.8
South Dakota	74,991	27.7	13.8	1.4	2.8	9.6	.1
Tennessee	213,779	26.3	8.4	.5	7.8	8.9	.8
Texas	363,491	28.2	14.1	.9	3.3	9.6	.3
Utah	43,198	21.4	6.5	.5	2.6	11.4	.5
Vermont	40,029	17.3	3.7	.3	1.5	11.6	.2
Virginia	169,454	24.9	6.1	.5	8.3	9.2	.9
Washington	113,255	26.4	10.4	.9	2.4	12.3	.5
West Virginia	65,013	15.7	4.5	.2	1.6	9.3	.1
Wisconsin	214,251	25.4	9.4	1.3	3.3	10.6	.8
Wyoming	38,045	19.1	5.9	.5	.7	10.5	1.5

— = Less than 0.1 percent
NA = Not applicable. New Jersey has no nonmetro counties.
Source: Calculated by ERS using Department of Commerce data.

Appendix table 12—The Food and Fiber System and the domestic economy, 1987-96

Item	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Employment:					Millions of jobs					
Total food and fiber	22.3	23.1	23.2	23.1	22.7	22.0	22.5	22.7	23.1	22.7
					Percent					
Share of domestic labor force	18.6	18.9	18.7	18.4	18.0	17.2	17.4	17.3	17.5	17.0
					Millions of jobs					
Farm sector	1.9	2.2	2.1	1.9	2.0	1.7	1.9	1.6	1.7	1.6
Nonfarm sectors	20.4	20.9	21.1	21.2	20.7	20.3	20.6	21.1	21.4	21.1
Food processing	1.6	1.6	1.6	1.5	1.5	1.5	1.5	1.4	1.4	1.3
Manufacturing	2.7	2.8	2.9	2.8	2.7	2.7	2.6	2.7	2.6	2.6
Transportation, trade, and retailing	6.7	6.8	6.9	6.9	6.8	6.7	6.7	7.0	7.1	7.1
Eating	6.4	6.6	6.6	6.7	6.6	6.4	6.7	6.9	7.1	6.9
All other	3.0	3.1	3.1	3.2	3.1	3.0	3.1	3.1	3.2	3.2
Total domestic economy	119.9	121.7	123.9	125.8	126.3	128.1	129.2	131.1	132.3	133.9
Value added by activity:					Billion dollars					
Total food and fiber	709.1	777.1	813.0	817.0	801.3	839.5	857.0	962.7	971.3	997.7
					Percent					
Share of domestic economy	15.1	15.4	14.9	14.2	13.5	13.4	13.1	13.9	13.4	13.1
					Billion dollars					
Farm sector	52.7	57.6	60.4	62.2	57.4	66.1	51.1	73.6	50.7	71.3
Nonfarm sectors	656.4	719.5	752.6	755.8	743.9	773.4	805.9	889.1	920.6	926.4
Food processing	91.7	100.7	100.8	100.6	96.2	96.4	100.8	109.1	114.7	108.0
Manufacturing	119.9	133.5	136.5	134.0	127.1	132.7	136.1	154.9	158.3	161.3
Transportation, trade, and retailing	214.3	230.5	246.0	244.6	246.9	260.9	273.0	301.6	313.6	317.0
Eating	92.1	101.8	107.3	107.8	108.3	113.8	122.2	135.2	142.3	139.2
All other	138.4	152.0	161.1	167.8	165.4	171.7	173.7	188.3	191.7	201.0
Total domestic economy	4,692.3	5,049.6	5,438.7	5,743.8	5,916.7	6,244.4	6,558.1	6,947.0	7,265.4	7,636.0

Source: Calculated by ERS from supporting ERS economic models using data from the Bureau of Economic Analysis, Bureau of Labor Statistics, and Bureau of the Census.

Economic Activity Triggered by Agricultural Trade

Estimates of economic activity related to agricultural exports show that exports make an important contribution to the farm sector and to the U.S economy as a whole. In 1996, the United States exported $60.4 billion of agricultural products, up from $55.8 billion in 1995. Those exports support jobs on farms, in food processing and other manufacturing plants, and in the transportation and trade sectors. Agricultural exports generated an estimated 859,000 jobs in 1996, of which 292,000 were on farms. The impact of agricultural exports on the U.S. economy is far-reaching. Every dollar of exports generated an additional $1.32 in economic activity in supporting sectors.

Imports of agricultural products were worth $33.6 billion in 1996, up from $30.0 billion in 1995. Since agricultural exports exceeded imports, the United States had a positive trade balance in agricultural products of $26.8 billion. About $8.2 billion of imports were such commodities as bananas, coffee, and tea that do not compete with U.S. products. The remaining $23.7 billion is comprised of imports, such as meat, dairy products, fruits, nuts, vegetables, sugar, and wines that compete with U.S. products.

Processed agricultural products have more extensive impacts on the U.S. economy than exports of bulk unprocessed commodities. Each dollar of nonbulk agricultural exports (fresh fruits and vegetables and "value-added" processed products) generates an additional $1.70 in supporting activity, compared with $0.85 for each dollar of bulk exports (grains, oilseeds, and cotton). Every $1 billion of nonbulk exports supports 16,800 U.S. jobs, compared with 11,100 for bulk exports. Nonbulk products account for most of the economic activity generated by agricultural exports. They account for 558,000 of the 859,000 jobs attributed to agricultural exports. *[William Edmondson, 202-694-5374, wedmonds@econ.ag.gov]*

Appendix table 13—U.S. economic activity triggered by agricultural trade

Item	1994 total	1995 total	1996 Total	1996 bulk	1996 Other
			Billion dollars		
Economic activity generated by agricultural exports	109.5	132.9	139.9	50.3	89.6
Exports	45.7	55.8	60.4	27.2	33.2
Imports	26.8	30.0	33.6	1.7	31.9
Competitive	20.1	21.6	25.4	1.7	23.7
Complementary	6.7	8.4	8.2	0.0	8.2
Trade balance	18.9	25.8	26.8	25.4	1.4
Supporting activities	63.8	77.1	79.5	23.1	56.4
Farm	16.9	20.0	21.9	2.7	19.2
Food processing	5.6	6.3	6.7	.3	6.4
Other manufacturing	14.2	15.5	15.5	5.5	10.0
Trade and transportation	8.3	9.8	9.7	3.0	6.7
Other services	18.8	25.5	25.6	11.6	14.0
			Percent		
Nonfarm share	74	74	73	88	66
Multiplier (business activity				*Dollars*	
generated by $1 of exports)	1.39	1.38	1.32	.85	1.70
			1,000 jobs		
Employment due to exports:					
Total	791	895	859	301	558
Farm	305	333	292	103	189
Number of jobs per $1 billion of exports	17.3	16.0	14.2	11.1	16.8
			Percent		
Percent of farm workforce	9	10	8	3	5
			1,000 jobs		
Nonfarm	485	562	566	197	369
Food processing	78	84	86	1	85
Other manufacturing	71	71	70	21	49
Trade and transportation	178	200	196	81	115
Other services	158	207	214	94	120
Domestic equivalent of the economic activity generated by			*Billion dollars*		
competitive imports	49.7	53.6	62.8	3.5	59.3
Net business surplus of agricultural trade	53.1	70.9	68.9	46.8	22.1
Nonfarm, nonfood processing sectors:					
Net direct benefit from exports	4.9	6.7	6.8	4.9	1.9
Net increased output from exports	41.3	47.8	41.6	26.2	15.4
Farm share of income generated by			*Percent*		
exports	31	32	34	45	26
Trade and transportation share of total income from exports	21.8	21.7	21.2	21.3	21.2

Source: Calculated by ERS from supporting ERS economic models using data from the Bureau of Economic Analysis, Bureau of Labor Statistics, and Bureau of the Census.